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# FOOD MANUFACTURE

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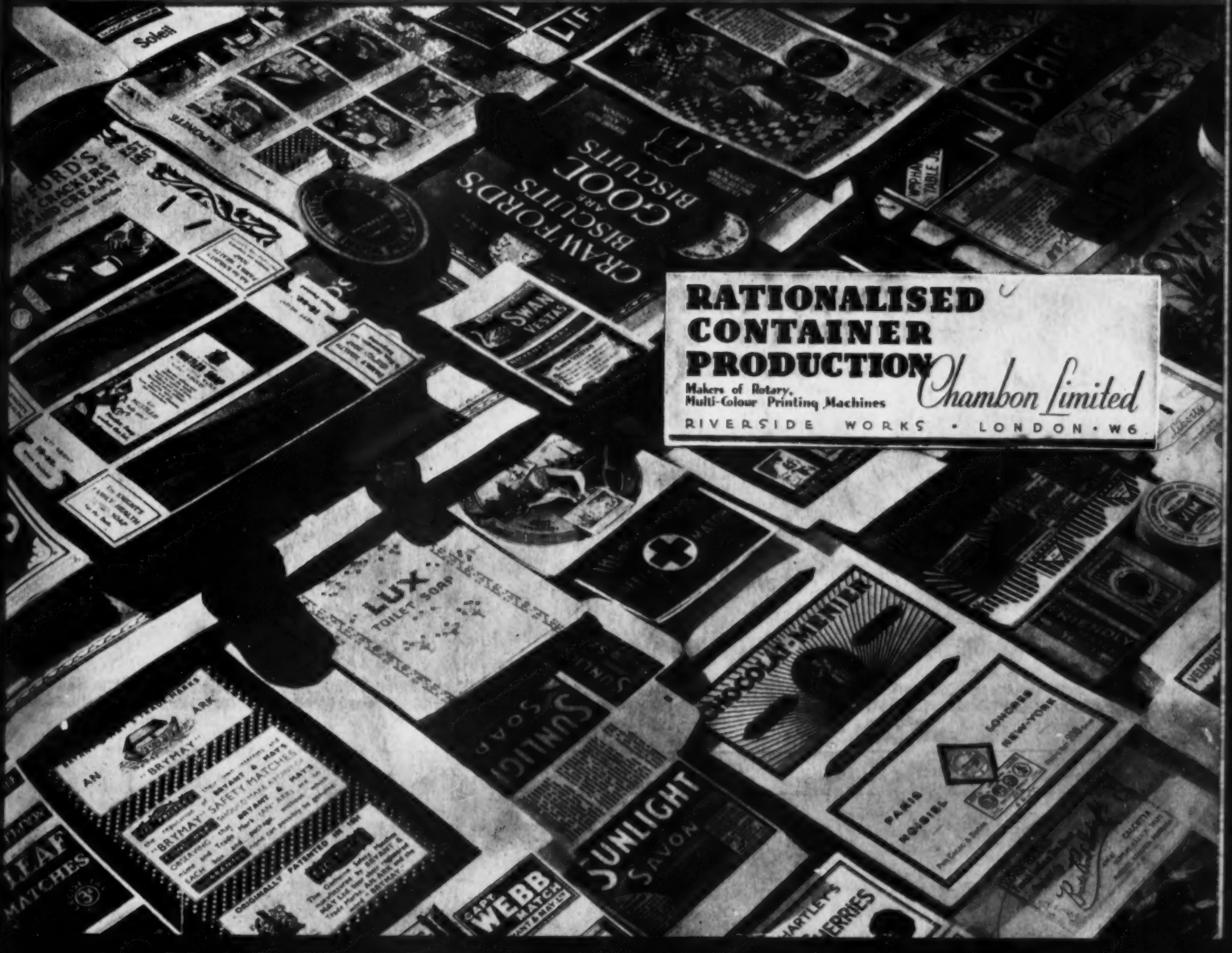


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# FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

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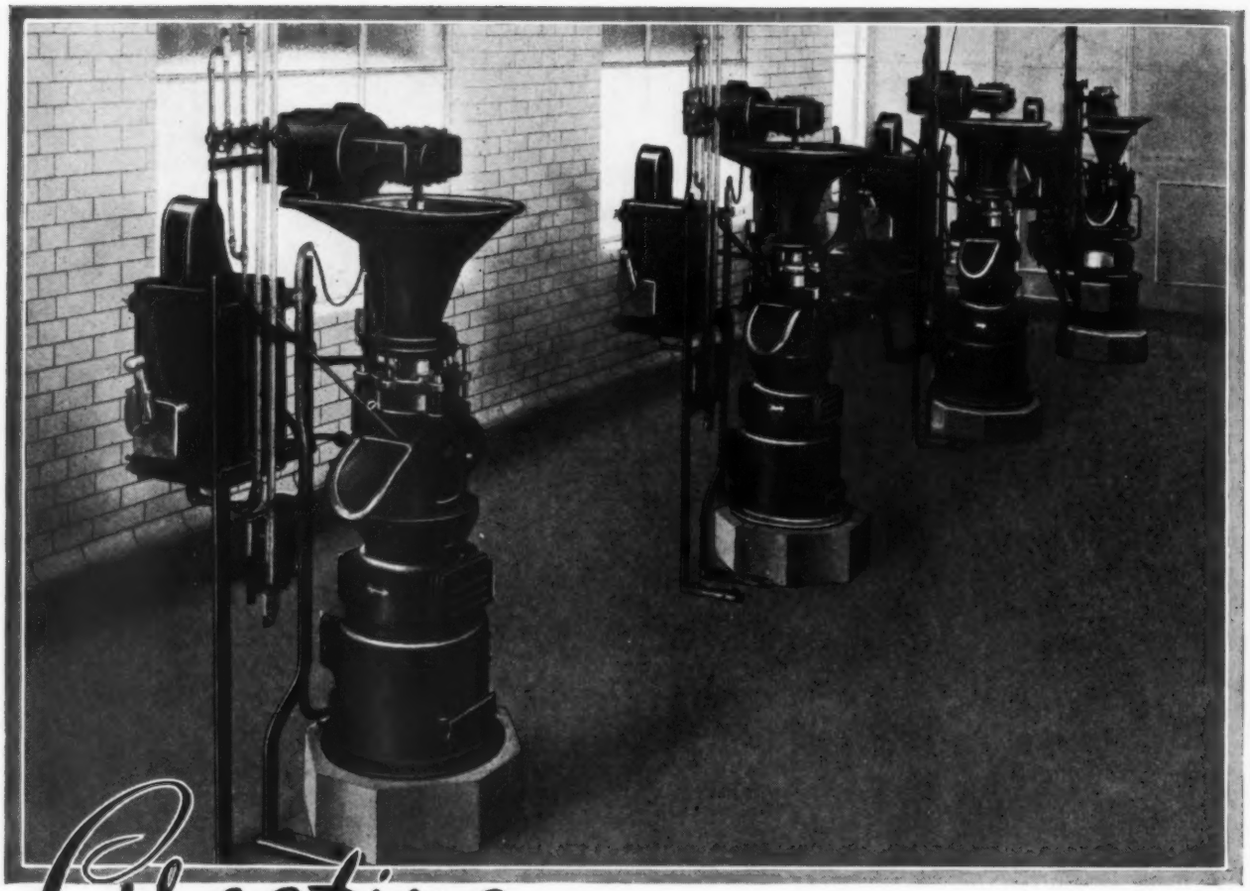
The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.



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FOOD MANUFACTURE

Vol. X, No. 11 November, 1935

## The Cardiff Convention

THERE IS every appearance that the Ninth Annual Convention of the National Food Canning Council, held this year from October 29 to 31 at Cardiff, will outshine its predecessors. The organisation of this annual rally of the canning fraternity is in the capable hands of Mr. Packer, and the arrangements which have been made to facilitate the convention reflect great credit on his abilities.

The programme this year is both interesting and varied, much more so even than on any previous occasion. The exhibition of fruit and of canning machinery is being opened by the Rt. Hon. David Lloyd George, supported by the Lord Mayor of Cardiff. There is a " Can-Can " dinner, a golf tournament, works visits, dances, and a Conference on the nutritive value of canned foods.

## The Conference

This Conference is the first one of a technical nature which has been held for several years on such an occasion, and it is to be hoped that its success will encourage the National Food Canning Council to continue to introduce a technical conference into the Convention's proceedings. This year the Conference is opened by the Editor of FOOD MANUFACTURE, Dr. H. B. Cronshaw, who is followed by several eminent authorities, including M. Henri Cheftel of Paris and Miss Olliver of Cambridge. Both are well known for their researches into important problems connected with the canning of fruits and vegetables. M. Cheftel has achieved fame from his work on certain bacteriological and processing aspects of canning, while Miss Olliver, who is on the research staff of Messrs. Chivers at Cambridge, was associated with Mr. T. Rendle, also of the same firm, in the discovery of the fruit softening fungus *Byssochlamys fulva*. More recently Miss Olliver and the Chivers' research staff have been devoting their attention to the nutritive values of canned fruits and vegetables, with particular reference to their vitamin contents.

## Canning Research

It is fitting on this occasion to refer to the work of the British canning research station at Campden, under the direction of Mr. F. Hirst, particularly as the Annual Report for the period 1933-34 has recently been issued.

It would only be repeating what is well known to every canner, not only in this country, but abroad also, were we to enlarge upon the magnificent services which Mr. Hirst and his staff have rendered to the industry and to the science of canning in general. It is a remarkable example of perfect co-operation between science and industry. Of all the centres of research associated with our industries this stands out as an achievement of that difficult feat of striking a wise and efficient balance between research and practice.

## Campden's Report

This last report is no less valuable than its predecessors in the useful information which it contains. The main sections summarise the results of experiments in canning trials on varieties of fruits and vegetables; the diffusion of acid and sugars during processing and storage of canned fruits; the determination of the texture of canned fruits and vegetables, and the factors affecting texture; the nature and source of headspace gases; the control of spoilage of processed fruit by *Byssochlamys fulva;* the measurement of vacuum in sealed cans.

## Hydrogen Swells

The problem of hydrogen swells has been the subject of close study for a number of years. Some interesting conclusions have been drawn from fairly recent tests, and it is hoped that the results of the 1934 trials will carry the problem a definite stage nearer solution.

As a result of the experiments made in 1933, it was decided to test in particular various new types of tinplate, the action of certain inhibitors, the effect of ripeness and of holding fruit for a period

before canning, and the use of methods of lacquering designed to protect the seams of the cans.

## Lacquer Tests

Improvement in the methods adopted for lacquering the cans tends very materially to reduce the subsequent discoloration of red and purple fruits. Each season new lacquers are tested and new methods of applying the lacquer. Some very satisfactory results have recently been obtained, and in the latest experiments lacquer surfaces have remained intact and the purple fruits free from discoloration after as long a period as five months' storage at a continuous temperature of 95° F.

## Ripening of Peas

Work is also proceeding at Campden with the object of ascertaining the tendency of each variety of peas to ripen at a fast or slow rate.

Additional work in progress includes the influence of soil on the colour of vegetables, the heat-stability of cream and evaporated milk during canning, as well as other lines of work, all of which goes to demonstrate the extremely valuable nature of the service which this station is rendering the canning industry of this country. Above all, Campden presents its reports so that they can be readily understood by the practical man who is not necessarily versed in scientific jargon. This might well be emulated by several of our other research stations.

## Little and Often?

In our youth we once stayed at a hospitable farm in Yorkshire where the motto about eating was "little and often", and breakfast and lunch were separated by "elevens", and a varied tea broke the span of lunch and dinner. Our recollections of this régime are pleasant. In recent years the snack bar has become so popular that the pros and cons of frequent, rather than heavy, meals deserve consideration. In America scientific research has been applied to the subject, and Haggard and Greenberg of Yale have published a book on Diet and Physical Efficiency. In it they have correlated the variation of physical efficiency in factory workers at different parts of the working day with variations in blood, sugar and respiratory quotients, and find that all three are low when work is done after a meagre breakfast or at periods long after a meal. They direct attention to the spacing of meals throughout the twenty-four hours rather than to the total quantity or quality of foodstuffs consumed.

## Mealtime Slavery

In this connection we were interested to read a most spirited article the other day by Dr. T. J. Bennett, which he called "Further Steps Towards Slavery". In it he inveighs in no uncertain terms against the habit of regular mealtimes, and champions the primitive method of eating to satisfy hunger, rather than to answer the peal of the dinner gong, and claims our freedom "to eat what we like and when we like". Incidentally, Marie Lloyd said the same thing in a slightly different way long before Dr. Bennett! Dr. Bennett makes ample reference to Haggard and Greenberg's book, and points out that in the case of factory workers, by increasing the number of meals from three to five without making any increase in the amount ingested, the physical efficiency of the worker was augmented by a very definite amount as gauged by output. The two additional meals were given in the middle of the morning and the middle of the afternoon, thus playing the same part as the "elevens" and "four o'clock" of our Yorkshire farm. The food given in these two extra factory meals consisted of cake and milk-carbohydrate food, being the factor necessary to improve physical efficiency.

## Dietetic Freedom?

Dr. Bennett criticises the findings of Haggard and Greenberg with considerable gusto. "It is clear", he says, "that if these American workpeople were given a slice of cake and a glass of milk in the middle of the morning and afternoon they would produce more tennis shoes, and physicians versed in the difficulties of treating cases of peptic ulcer will immediately recognise that the suggested change of diet would be an immense benefit to any workpeople having a tendency to this disease; *but* does the community require more tennis shoes? *should* the healthy man's diet be on the same lines as that of one convalescent from duodenal ulceration? and *is* mankind happier when housekeeping and domestic life are reduced to the barest possible minimum?" These are salient points to be considered when the question of a diet of snacks is discussed. One may not agree that the habit of the wild animal—human or other—to hunt for long hours or days and, having killed, to eat to repletion and then indulge in a long sleep, is a physiological ideal, but it certainly is a fact of nature. There is a lot to be said on both sides, but it must be remembered that generalisations in the matter of diet are always dangerous—one man's meat is another man's poison—and while one appreciates the efforts

of such workers as Haggard, Greenberg, and others to bring the problems of human diet to standardised limits determined by statistical considerations, it must always be remembered that the human element constitutes a variant that makes it difficult to elaborate satisfactorily any such plan in practice.

## Synthetic Foods

In recent years considerable attention has been devoted to the effect of synthetic foods on human nutrition and general health. Such foods as have had added to them certain chemical substances, known to be of nutritional value, have been subject to much adverse and bitter criticism by many members of the medical profession, who ought to know better, and the army of food faddists, who can't help it. We have recently heard that this year saw the killing, at Cornell University, of the first two "synthetic sheep". This seems to be a strange statement, but it does not imply that the synthesis of life has been achieved! Apparently these creatures were taken from their dams in the first few days of life and brought up on a synthetic diet composed exclusively of synthetic substances, protein, carbohydrate, fat, concentrated vitamins, and salts. Not only did these "laboratory babies" grow up well, bearing wool of the highest quality, they were also free from many of the parasites common to the normal sheep. There are many indications that the days of shying at anything synthetic or artificial in foodstuffs are over, and now the biochemist and food technologist are taking their legitimate place in the provision of the most nutritious food for the people.

## The League and Health

It is satisfactory to note that amid the complication and confusions brought about by the present European situation, the League of Nations has found time to deal with such problems as public health and nutrition. Last month a report on nutrition in relation to public health was submitted to the Assembly from the Second Committee and approved. The report ended with a resolution in which the Assembly requests the Council to invite the Health Organisation of the League to continue and extend its work on nutrition in relation to public health, to instruct the technical organisations of the League, in consultation with the International Labour Office and the International Institute of Agriculture, to collect, summarise and publish information on the measures taken in all countries for securing improved nutrition, and to appoint a committee containing agricultural, economic, and health experts, with instructions to submit a general report on the whole question to the next Assembly. Whatever may be the result of the League's struggle to maintain peace in Europe, its continued efforts in such matters as public health and nutrition, international agriculture, suppression of dangerous drugs, and other such problems are bound to be of great public benefit, and the pooling of international information saves much time and unnecessary overlapping.

## Poverty Amid Plenty

One could not fail to be impressed by the discussion in the Second Committee of the League of Nations, opened by Mr. Bruce, the High Commissioner for Australia, on the relation of public health to the problem of agricultural production. His subject was the now familiar topic of hunger amid a glut of food—the paradoxical situation of underconsumption of food by all communities on the one hand, and a glut of accumulated products on the other. We have referred to the efforts of the League of Nations in the direction of Nutrition and Health. The discussion opened by Mr. Bruce refers to another aspect—that of harnessing world agricultural production to the problems of health and nutrition. The world depression, marked first of all by a fall in the prices of prime commodities and then by the increasing failure of the world's markets to absorb them, was not due to over-production, but because consumers could not afford to purchase them even at the lower prices. There has never been over-production in the sense that supplies have exceeded the needs of the world's population. This incapacity to buy increased obviously, as the prime producers themselves, through inability to sell their products, were unable to take other articles in exchange. In every country—no matter how high the standard of living—there is a section of the people suffering from an insufficiency of good food. All over the world there is an existing, or potential, surplus of food. How can these anomalies be corrected? That is the problem now being faced by the League of Nations. The problem is not a simple one, and there are many conflicting interests, but it should not prove to be an impossible one.

## Germany Goes Teetotal

The fifth biennial tour of the National Association of English Cider Makers was held in September, when the cider and wine districts in Germany were visited by a party of seventeen, which included technical representatives from

cider, wine, and fruit squash concerns. The tour was organised and conducted by Mr. Vernon L. S. Charley, of the Department of Fruit Products, University of Bristol Research Station, Long Ashton.

Every effort was made by the various German authorities and firms to make the visit a thorough success both from the technical and social points of view, and the recent developments which were revealed came as a great surprise to most of the party.

## Cider Manufacture

German cider is always considered to be more closely related to the English beverage than the French, on account of the sharper types of apples used in its manufacture, but the aroma and flavour of the cider tasted in a Frankfort factory was remarkable for its splendid vinous character and smooth drinking properties. It appeared that the natural flora of the juice was removed by centrifuging the fresh juice and inoculating with a pure culture of wine yeast from the Government station. The vinous character was most marked, and the use of the centrifuge would seem to be a distinct improvement on the earlier pasteurisation process, which was often responsible for a "cooked" taste in the cider.

A further feature of this fermentation by pure yeast was the remarkable natural clarification which resulted. The cider was allowed to stand on its lees until the following summer, and by this time a product which was practically brilliant could be drawn off, and for bottled trade only the very simplest form of filtration would suffice to ensure a satisfactory finish.

The characteristic Teutonic thoroughness was seen in the pumps which were used to draw off the $CO_2$ formed during fermentation and to compress it into cylinders for use with the alcohol-free juice process noted below.

Elaborate cellar space is the feature of all German factories of this type; temperatures are generally about 10° C., and, owing to the proximity of the factories to the Rhine, precaution has to be taken to bolt down the vats during the winter, for the water often rises to a height of several feet in the cellars.

## Non-Alcoholic Juices

Perhaps the most significant development in Germany from the beverage point of view is the tremendous rise in popularity of unfermented fruit juices. The consumption of these beverages is stated to have increased one thousandfold in the past six years, and the demand is now greatly in excess of the production. This position is remarkable, for wine is cheap in Germany, and splendid Moselle wine could be purchased for as low a price as two shillings a bottle. But despite the presence of this cheap source of alcoholic wine, there seems to be a definite and rapidly growing demand for alcohol-free drinks, and it is a matter of some importance whether a similar demand could be fostered in this country.

## Apple and Grape Juices

The products tasted in Germany were excellent, although the grape juices were fuller in character than the apple. The former were inclined to be too heavy and sweet, while the latter, with their enhanced acidity, more nearly approached the required character for a thirst-quenching beverage.

Two processes were in use, the first involving sedimentation of the juice followed by rough filtration, and lastly sterilising filtration through the Seitz E.K. filter, the only type used in Germany for this purpose. The sterile juice is run into carefully sterilised vats and allowed to mature without fermentation until hot weather creates a demand.

The other process, many elaborate installations of which were visited, is more expensive but more reliable. It utilises the Seitz-Bohi discovery that a very high pressure of $CO_2$ will prevent yeast development. Large enamelled tanks are filled with fresh juice which has been impregnated with eight atmospheres of $CO_2$, and juices stored in this manner will remain in an unfermented condition for over twelve months.

## Freezing Concentration of Fruit Juices

The concentration of fruit juices by heating *in vacuo* has always been considered as detrimental to flavour, although in very recent years vacuum evaporators have improved to such a degree that the "cooked" effect is slight. But the production of a concentrate from fresh fruit juice offers so many advantages from a storage point of view that the recently introduced Krause-Linde process for concentration by freezing had more than ordinary interest to the members of the party. The process was seen on a commercial scale in Karlsruhe and again in the original experiment plant at Dotzheim, near Wiesbaden. The fresh fruit juice is frozen in such a way that the ice crystals are formed in regular laminations. The ice block which contains the concentrated juice is centrifuged, and by this means a stable product with 60 per cent. sugar is obtained. Samples of the concentrate retained to an impressive degree the fresh fruit flavour, and on dilution afforded very attractive beverages.

# Principles and Practice of MEAT CANNING

By A. SAMSON, A.R.C.S., A.I.C.

## Part I

IN WRITING on the subject of meat canning I propose considering it in its widest aspect—namely, the practice of packing meats and products containing meats into tin and glass containers.

The origin of the canning of foods is well known, having been first commercialised by Nicholas Appert, a Frenchman. Meat canning has been carried on in this country for many years. During the early years the business was carried out on trial and error principles, but during the last few years the practice of meat canning has been looked upon as one requiring scientific assistance. It is now fully appreciated that it is in every sense a true science, involving the application of the resources of biology, bacteriology, chemistry, physics, and engineering.

Whilst the reasons for meat canning are fairly obvious the same cannot be said of the principles involved. Unfortunately, too many meat packing concerns have been satisfied to carry on their business with little appreciation of the scientific principles implicated, scarcely realising that their success depended on the scientific manner in which they carried out their work.

In the manufacture of canned meats there are certain definite landmarks which must ever be kept before the eyes of the manufacturer in order that he may steer a successful course for his concern.

### Safety and Quality

The most important landmark is that of *safety*. All canned meats must be safe to consume, and by this I imply *bacteriological safety*—that is, the absence of those bacteria from the products which, if present, would produce illness in the consumer. (We need hardly fear chemical danger, as it is practically non-existent to-day in canned meats.)

There is also the question of *commercial safety*, by which is meant the absence of those bacteria which produce spoilage. The question of bacteriological safety in canned meats is of paramount importance and it is the landmark which stands out beyond all others.

Next in importance is the question of the *quality* of the products. This term quality in its widest sense involves the appearance, texture, and the flavour of the products.

These two words, "safety" and "quality", may perhaps be considered the most important essentials. Strict observance of them will lead the canned meat manufacturer along the path of successful business.

To-day safety and quality stand for years of scientific study, technical development, and commercial application, and it is only by the full realisation of all that they mean that the canned meat manufacturer can hope to carry on his business with any measure of success.

Of all the foods I have preserved in tin and glass containers—and these embrace meats, fish, fruits, vegetables, and other foods—I am of the definite opinion that meats are the most difficult to can successfully—bearing in mind the factors of safety and quality.

Meats may be considered (for the purposes of this article) as an accumulation of protein (flesh), fatty matter, and liquid (juice)—each constituent behaving differently in the various treatments given to produce the finished article.

On heating, the protein (or flesh) shrinks considerably, shedding much water, thus altering the size and shape of the original product. The fatty tissue liberates much fat, which is apt to spoil the appearance of the finished article, and the juice is liable to coagulate, forming undesirable precipitates—also interfering with the finished appearance. It will thus be realised that to produce the satisfactory finished article every effect on each constituent must be fully understood.

### The Question of Sterility

Meat, as received in the factory, whether it be frozen tongues, briskets, or veal, is always contaminated with bacteria. The characters of the bacteria present may be widely different; some are non-sporers, others sporers, some pathogenic, and some even spoilage bacteria. Some of these may be destroyed by fairly low temperatures, whereas others may require high temperatures for a long time to effect their destruction.

Whatever the character of the organisms, bacteria will always be found present in meat. It must be definitely understood that meat and juice form excellent media for the growth of most bacteria.

It is easy to treat meat in tin or glass containers by heating, so as to produce absolute sterility—that is, complete destruction of all bacteria—but by so doing there is the danger of spoiling the quality of the finished product and rendering it unsaleable. Some middle course must be steered, aiming at a point nearer the "safety" mark than the "quality" mark. This is necessary if the product is to be commercial.

We are therefore in a position to define "canned meats" (in a general sense) as "products packed in tin

or glass containers, in which all food poisoning or harmful bacteria, or all spoilage organisms have been destroyed (if ever they were present), and in which the flavour, appearance, and texture of the product have been maintained to the highest degree".

From the above definition it will be noticed that the absolute sterility of the material is not emphasised. It is quite possible to have sound cans of meat, and meat products, and yet, on bacteriological analysis, bacteria may be found present, but they will not be of the spoilage or poisonous type. This is known as "commercial sterility".

## Cleanliness

One of the most important factors of success in meat canning is *cleanliness*. By cleanliness I do not suggest the abusive use of disinfectants, but infer the general cleanliness of the factory, cleanliness of technique, cleanliness of plant and all utensils, cleanliness of the products, and cleanliness of the personnel.

The importance of cleanliness can be realised when it is stated that dirtiness breeds bacteria, and the more bacteria present in the meat the more the chances of spoilage or danger; hence the more severe is the heat treatment necessary to produce "commercial sterilisation". Cleanliness must be the password, the religion, of the factory.

## Processes Involved

In the canning of meats, different products require different treatments, but there are many manipulations common to all, such as refrigeration, brining, cooking, jellying, packing, cooling, sterilising, etc.

It will be my endeavour to trace the movements of the material through the meat canning factory, and to draw attention to those points which I consider of paramount importance, but which are often passed over, even though they may appear quite obvious.

In order to can meat successfuly, the manufacturer must realise that he is dealing with a raw material, meat, which is an excellent breeding ground for his most dangerous enemies, bacteria, and it will be decidedly in his favour to deal with his products as quickly and as cleanly as possible, keeping them as cool, or as hot, as possible, whichever may be the immediate necessity. Such is the rough outline of meat canning.

## Refrigeration

In the raw state, meat is much affected by temperature, a few degrees increase rapidly producing deterioration, brought about principally by bacterial agencies. The best means to prevent such deterioration is refrigeration. All meats received into the factory should be refrigerated, unless they are to be used immediately.

In the first place, it is important that the refrigerator be of sufficient capacity for the factory. Its temperature must be closely controlled and it must not be overloaded. No warm meats should be put directly into the refrigerator. It must be kept scrupulously clean. The walls and floors must be washed once weekly with a weak chlorine solution, and it should be painted regularly.

If frozen meats are received into the factory—such as tongues, briskets, bag veal, etc.—they should be placed as soon as possible in the refrigerator, to take advantage of their low temperature.

Doors of the refrigerator should not be left open longer than necessary. In fact, there should be provided a system of double doors, and factory hands should be warned of the danger of allowing warm air to enter the refrigerator.

Do not leave bad or tainted meat in the refrigerator, as the remainder of the contents will soon become contaminated with "friggy" odours.

It is sometimes advisable to wash certain meats before placing them in the refrigerator. This helps to remove slime and other bacteria-harbouring surfaces.

If meats are to be held for some considerable time in the refrigerator, the temperature should be maintained at a low level, of the order of 10° to 20° F.

When handling meats from and into the refrigerator, I advocate the use of metal trucks. They are much easier to clean, and keep clean, and there is less chance of spreading bacterial infection from one load to another, as is possible when using wooden trucks.

## The Brine House

When meats leave the refrigerator they may undergo a cooking or a brining process. In some cases, as with briskets, meats are boned.

We will now follow the meats into the brining department, which may be considered as that department where meats are held in brine—a solution containing salt, saltpetre, and/or nitrite—in order to "cure" them, which means salting, flavouring, and colouring the meats.

The principle of brining is well understood. It is the gradual penetration of salt into the meat in order to effect some degree of preservation, the extraction of some water from the meat, and the gradual penetration of nitrate and nitrite into the meat which, with the aid of the bacteria present in the meat and the brine, and the hæmoglobin in the blood, help to produce the red colour of "cured" meat.

A word about the brining house itself. The old idea that this should be a poorly lighted, poorly ventilated cellar is entirely wrong. I would rather suggest that the brining house should be a large-scale laboratory, well lighted, well ventilated, with pure cold air, walls of smooth cement, or, better still, glazed bricks, and floors of smooth-finished concrete or stone surface.

For brining tanks I do not advocate the use of wood. I suggest either glazed brick, smooth-finished concrete, or slate tanks. Wood harbours bacteria. It should be possible to drain thoroughly all brine tanks. The floor should be well drained; there should be an adequate supply of clean pure water; the atmosphere must be clean and cold. The temperature, at all times, for efficient brining should range from 38° to 40° F. Low temperatures delay the "curing" process, but help to restrain the development of undesirable bacteria; whereas high temperatures hasten the "curing" process, but also increase the bacterial growth—sometimes with unhappy results.

It will be found that the temperatures stated above will give the best, cleanest, and sweetest "cure", although perhaps taking a little longer to accomplish.

At all times brine tanks, walls, and floors must be kept scrupulously clean—occasionally using a weak chlorine solution for washing, followed by cold water rinses. There should be no pot-holes in the floor, allowing the accumulation of puddles of brine or meat juices. These are dangerous sources of bacteria. It is necessary to emphasise the cleanliness of the brine house, as this is one of the first possible sources of bacterial infection in the factory. In my various investigations I have found that more spoilage commenced in the brine house than had ever been realised.

## Salt

In discussing the various ingredients of a brine, it is best to consider the quality and purpose of each. One of the most important constituents of a brine is salt. The purpose of the salt is to help preserve the quality of the meat during the formation of colour, to impart flavour and to "firm-up" the meat tissues.

Many manufacturers believe that any quality salt will do. This is a fallacy. Impure salts contain relatively large quantities of impurities such as calcium and magnesium compounds. These impurities produce two undesirable results; they affect the flavour of the meat, and by their penetration into the meat they are apt to interfere with the clarity and brilliance of jellies in the tin and glass containers by the production of insoluble calcium and magnesium precipitates. Hence I advise the use of only the best possible salts. These are generally known in the trade as "stoved vacuum" salts, and on analysis show a content of 99·8 per cent. NaCl (minimum). The use of cheaper grades of salt is folly and will certainly lead to trouble. In meat canning it is not possible to obtain the best results by using the cheapest salts.

## Saltpetre

There are two classes of saltpetre used. One is ordinarily known saltpetre, which is potassium nitrate, or Indian saltpetre, and the other is known as Chili saltpetre, or sodium nitrate. This latter nitrate is stronger than the potassium salt, containing a larger proportion of the $NO_3$ radicle. Approximately 85 parts of sodium nitrate are equal to 100 parts of potassium nitrate. Therefore, due allowance must be made for this when using the sodium salt. It is advisable to submit samples of saltpetre purchases to a laboratory for check-analysis.

## Sugar

Sugar is sometimes used in brines, producing "sweet pickles". Its use depends on the individual manufacturer's opinion. The quantities are not large, and it is not usual to use the finest quantities.

Some manufacturers use Demerara, some the cheaper forms of white, and some brown, sugar. Whatever qualities are used, it should be emphasised that they contain the minimum of impurities, particularly sulphur dioxide. Generally, the cheaper the sugar the higher the percentage of moisture present, and this is almost the only impurity.

## Other Ingredients of Brine

Another ingredient of brine is sodium nitrite. Legally, this is not supposed to be used, but it is, so a word will not be out of place!

The sodium nitrite salt is more often used than the potassium salt. The sodium compound is very powerful in its action and must be most carefully handled. Its use must be strongly controlled, as it is liable to produce undesirable results.

There are sometimes other materials used in brine, but, again, their use depends on the individual taste and opinions of the manufacturer. These include spices, herbs, and sometimes even beer! As they are used to a very minor extent, I do not propose to deal with them.

## Preparing the Brine

Of course a most important ingredient of brine is the water. This should be pure, free from taste and odour, and if it is passed as "fit for drinking" will satisfy the recognised bacteriological and chemical standards. Water that is too hard is undesirable on account of the excessive presence of calcium and magnesium compounds.

A soft water is useful, providing there is the minimum quantity of alkali present, as excess of alkalinity favours the growth of undesirable bacteria. A suitable water lies between the range of 0° to 20° degrees of hardness.

In preparing a brine to receive meats, I would suggest that the actual preparation be done several hours before the meats are ready to be placed in the brine. This will give the brine man an opportunity to ensure that all the ingredients are completely dissolved, a most important feature.

In my opinion, there is no necessity to dissolve the ingredients first in hot water to effect a quicker solution, providing they are in a fine state. If there are any lumps, these should be broken down before attempting their solution.

A good plan in preparing brine is first to run into the tank about one-quarter of the water required, and then to add the requisite quantities of salt, sugar, saltpetre, nitrite, and other ingredients, stirring them into the water. After these have been added the remainder of the water is run in. This will help to mix and dissolve the various salts.

The brine must be frequently stirred in order to ensure complete solution, and no meats are to be placed into the brine until this is the case.

## Strength of Brine

All brines *must* be tested with a "Brinometer" or "Salometer", which is an instrument by which the percentage of salt present in the brine can be rapidly determined. It is not possible to lay down standards for the quantities of the various materials to be used.

With regard to salt, I advise not less than a 65° brine. The usual range is 75° to 80°. Some concerns actually use 100°, which is a saturated solution, but this is apt to produce too salty meats. The best range is 70° to 80°.

With regard to the quantity of saltpetre, this depends on the class of meats to be "cured". Too much salt-

petre is liable to produce an astringent flavour. Too little would fail to produce a satisfactory "curing" colour. The absolute maximum should be 10 lb. of ordinary saltpetre per 100 gal. of brine. I would suggest the quantity of 4 to 8 lb. per 100 gal.

The quantity of sugar is widely variable, ranging from 10 to 25 lb. per 100 gal.

With regard to the use of nitrite, it must be distinctly appreciated that this compound is about ten times as strong as saltpetre, and therefore not more than one-tenth of the quantity of nitrate should be used in the form of nitrite.

### The Brining Process

Some meats are "pumped" before being placed into the brine tanks. The same strength pickle will be suitable for pumping as is used for "lying-in" brine. Care must be taken not to pump too much pickle into the meats, as this tends to make the meat too watery and flabby.

If the brines and the meats which enter the brine are kept in as clean a condition as possible, it is remarkable for what length of time the brine can be used over and over again. Some brines last six months or more and still remain sweet and clean. A great deal depends on the cleanliness of the meats at the time they enter the brine. In order to achieve cleanliness of the meats I advocate a preliminary washing process. It is best that all meats, before brining, be placed in large concrete or glazed brick tanks into which is run clear cold water. The water should be maintained at a steady flowing rate. In this way it is possible to wash meats efficiently.

Moreover, it is also possible to thaw frozen meats such as tongues, veals, etc., without resorting to the dangerous practice of placing such frozen meats in warm or hot water. The time of immersion will naturally depend on the temperature of the meats. The higher the temperature, the shorter is the time occupied in the washing process, because of the possibility of removing important soluble constituents of the meat.

Of course, this process will take time, but the advantages in its favour—clean meats free from slime, dirt, and perhaps excessive numbers of bacteria, and also thawed-out meats—will well repay the time consumed. The process need never interfere with the general procedure of the brine department. I have actually treated under this washing process thousands of boxes of tongues ranging from ½ to 8 lb. in weight, frozen to such a low temperature that it was impossible to separate them.

The wood of the boxes was removed from the "block" of tongues, the tongues were dumped *en masse* into the washing tanks. This was done during the morning, the water running at a gentle rate, according to the capacity of the tank. During the day the tongues were frequently stirred in order to break up the frozen masses; during the night the water was still flowing. The night watchman was instructed to stir occasionally, and the next morning the tongues were observed to have separated; the ice was removed from them and the cleanliness of the meats was a pleasure to behold. The meats were then ready for treatment in the brine department. Such treatment will help to preserve the life of the brines and reduce the bacterial infection to a minimum.

When the meats are placed in brines it is advisable that they be stirred daily in order to ensure that the meats are in contact with the same strength of brine, which naturally alters during the progress of "curing". All meats should be covered at all times by the brine.

The addition of old brine to a new brine as a "starter" is not desirable. I prefer to leave the new brine to function a day or so longer. It is less dangerous.

After a batch of meat has been removed from the brine it is always advisable to "make-up" the brine with salt, etc., to the original formula, before the further addition of meats.

It is most important that the personnel of the brine house realise that the strictest cleanliness is to be observed. Dirty hands, dirty brines, dirty tables, etc., are sources of danger which are not proved until after the meats are packed into their tin or glass containers, when it is too late to save them.

I am of the opinion that the regeneration of brine by boiling and filtering does not pay. Far better dispose of the brine and start afresh. In any case, I do not advocate the retention of brines for too long a period. One batch of meats infected by old brine will more than offset all the money saved in salt and other materials.

(*To be continued.*)

## CANNED PRUNE JUICE

(Continued from p. 385)

Concentration of juice from third leaching, 22° Balling.
Average concentration of all leachings, 19° to 25° Balling.
Total volume of juice obtained after filtration, 14 gal. or 560 gal. per ton of prunes.

The combined lots of juice are then filtered through a pulp filter and concentrated to 20° Brix by boiling in an open kettle. The hot juice may then be bottled or filled into cans, sealed, and pasteurised at 180° F. for 20 minutes. If cans are used the new type plate cans should be used.

Sometimes the prune juice is concentrated to 65° to 70° Balling and stored in steel drums until it is to be used. It may then be diluted to 20° Balling and bottled or canned. If the juice is concentrated to 65° to 70° Balling a better product is obtained by using a vacuum pan rather than the open kettle for concentration.

Canned prune juice offers one very desirable advantage to canners. Because of the continuous availability of dried prunes it may be packed during the quiet season and hence reduce the factory overhead.

From a nutritional standpoint it may be interesting to note that prune juice has been found to contain the laxative principle so well known in prunes. It also contains fruit sugars, pectin, and mineral salts.

From all appearance, prune juice promises to become a very popular canned beverage.

# Canned PRUNE JUICE

by E. M. MRAK

Fruit Products Laboratory
University of California

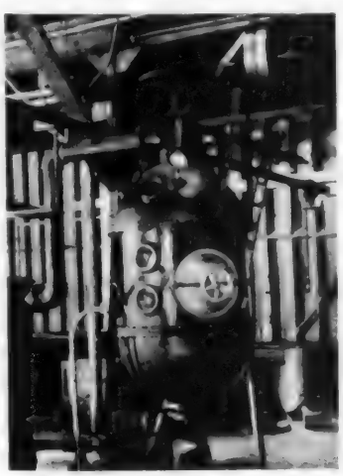
A Battery of Tanks used in the production of Fruit Syrup.

Tanks suitable for manufacturing Prune Juice.

DURING THE past few years the production of canned fruit juices has increased at a very rapid rate. A number of factors have been responsible for this large production of fruit juices. Improvements in canning method, cans, and can coatings have been very important factors in the development of the canned juice industry.

The work of Kohman and the National Canners' Association has made it possible to produce canned tomato juice with a high vitamin content. The citrus enamels developed by the can companies have greatly improved canned orange juice, and their development of the new type of tin has made it possible to can loganberry and prune juices.

One of the more recent juices to be produced and canned is prune juice. The experimental production of prune juice was first discussed in the *University of California Agricultural Experiment Station Bulletin* in 1932. Later the California Prune and Apricot Growers' Association developed prune juice commercially, and to-day a number of canners and packers are producing it.



A Vacuum pan suitable for prune concentrate production.

Prune juice is different from other fruit juices in that it is made by extracting dried prunes with water until practically all of the soluble substances have been removed. One of the common methods of preparing prune juice is to soak washed dried prunes in water, at 200° to 212° F. for about 3 to 5 hours and then drain. The first extract is then used to extract a second and, finally, a third or fourth lot of prunes. The first lot of prunes is extracted a second, third, and possibly a fourth time for an hour each time. The various extractions pass over the various batches of prunes and finally are all combined. After the first lot of prunes has been completely extracted the remains of the extracted prunes are discarded or used for hog feed. The tank is then filled with fresh prunes, which are extracted with liquors from the other extraction tanks. This continuous method is known as the diffusion battery procedure. The sugar and juice remaining in the leached prunes is insufficient to warrant pressing. If the prunes are boiled and pressed rather than extracted, the product obtained is very pectinous and exceedingly difficult to filter. For this reason the diffusion procedure is recommended over other procedures.

Laboratory experiments have given the following data concerning the yield of juice:

Weight of prunes used, 50 lb.
Volume of water used in consecutive soakings, 12, 7, and 5 gal.
Time of soaking each application, 3 hours, total 9 hours.
Concentration of juice from first leaching, 13° Balling.
Concentration of juice from second leaching, 24° Balling.

(*Continued on page* 384.)

# FRUIT PRESERVATION

## Cold and Hot Processing of Plums

By VERNON L. S. CHARLEY, B.Sc.

(Department of Fruit Products), University of Bristol
Agricultural and Horticultural Research Station,
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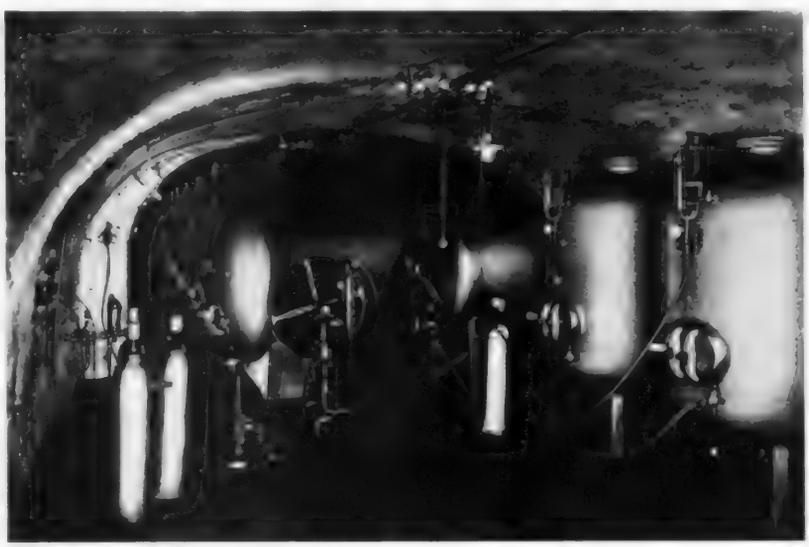
THE PRESERVATION of fruit by the cold method, which has now largely superseded the earlier pulping procedure, was subjected to a comprehensive enquiry by Barker and Grove[1] at the Long Ashton Research Station in 1925. They found that perfect preservation resulted when various fruits were preserved in solutions containing 800 to 1,000 parts per million of $SO_2$ in glass vessels capable of being hermetically sealed. These workers recognised the fundamental differences between treatment in glass and treatment in wood, owing to the impossibility of completely preventing access of air in the latter case. And, indeed, the pulp industry has found that in many cases the figures cited by the Long Ashton workers as the maximum that should be employed are far from sufficient for safe commercial management, and the following figures have been accepted by the Ministry of Health for fruit pulps:

| | |
|---|---|
| Cherries .. .. .. .. | 3,000 |
| Strawberries and raspberries .. | 2,000 |
| Other fruits .. .. .. .. | 1,500 |

The actual methods employed, discussion of the various points involved, pitfalls to avoid (of which there are many), and some scientific aspects of the pulping process have been fully discussed in previous volumes of this journal,[2, 3] and the scope of the present article will be strictly limited to a presentation of experimental data recently obtained by the writer at Long Ashton at the commencement of an exhaustive enquiry into the principles underlying the $SO_2$ treatment of fruit and their application to the needs of the jam industry. The experiments here described[4] relate solely to plums, but the work has since been extended to other fruits and the scope widened to include all aspects of the pulping process.

The main question which was under consideration when the experiments were commenced was this: What is the relationship between the strength and nature of the preserving solution and the residual $SO_2$ in the finished jam? Manufacturers naturally wish to combine absolute safety in preserving methods with economy in use of preservative and compliance with the legal Ministry of Health requirements, and it has long been one of the difficulties with which those who put down fruit pulp have had to contend that this supposed "safety" figure for $SO_2$ in pulp has caused an intake of $SO_2$ by the fruit of such magnitude that jam-boiling operations have had to be modified in order that the final $SO_2$ concentration could be reduced to the necessary figure. It is important to remember that the legal standard for $SO_2$ in jam does not discriminate between that $SO_2$ which is "free" and serves as the biological inhibitor, and that which is "fixed"—*i.e.*, combined more or less loosely with aldehydic compounds in the fruit juice and tissues. "Total" $SO_2$ (as determined by the Monier-Williams distillation-hydrogen peroxide method) must be present in quantities less than 40 p.p.m., and it matters not at all how much of this residual preservative is present as actual $SO_2$ or as innocuous compounds with complex formulæ and involved dissociation constants.

It would appear that there is an impression in some circles that the free $SO_2$ content in pulps can be continually kept up to the regulation limit by small additions of $SO_2$ at intervals without impairing the usefulness of the pulp for jam-making purposes. But while it is quite certain that some of this $SO_2$ which is not found to be titratable after a period has been lost by oxidation to $SO_3$ (which will be converted into sulphuric acid),



**The Seitz-Bohi Process for Unfermented Juice Manufacture.**
*(With acknowledgments to Seitz-Werke, Kreuznach.)*

it is equally certain that the $SO_2$ that is being "fixed" more or less firmly in the tissues of the fruit is the $SO_2$ that will persist through the boiling process and contribute the major portion of the residual $SO_2$ in the jam. With these considerations in view, the following investigations were carried out:

## Preservation of the Fruit

Thirteen cwt. of Coe's Late plums were preserved by the cold and hot processes as follows:

*Cold Process.*—Approximately 97 lb. plums were packed into each of a series of 15-gal. casks and covered with 4 gal. of accurately standardised preserving solution of $SO_2$ of two strengths; other treatments were carried out to compare the effect of a straightforward $SO_2$ solution with solutions of potassium metabisulphite and calcium bisulphite.

*Hot Process.*—Four cwt. plums were pulped in a 150-gal. vat provided with a false perforated bottom. The fruits were steamed until soft and were received into a further series of 15-gal. casks. Preservatives were added in concentrated form, calculated on the weight of the pulp in each cask. Potassium metabisulphite was used in the solid condition and the calcium bisulphite as commercial 6·5 per cent. solution. Three strengths were used with each salt—namely, 3,000, 1,500, and 750 p.p.m. The casks were bunged down and were stored for one month before being opened and the contents made into jam.

## Conversion of Pulp into Jam

The open distrust with which some manufacturers view laboratory experiments as a basis for commercial procedure led the writer to limit the scope of the jam-boiling trials that had been originally planned, in order that sufficient fruit would be available to carry out two batch boilings of a reasonable scale on each sample of preserved fruit. A steam-jacketed jam-pan was used, and the following recipe was adopted for use with both types of pulp:

| | | | |
|---|---|---|---|
| Fresh fruit .. | 27 lb. | Pectin .. .. | 4 oz. |
| Water .. .. | 12½ ,, | Tartaric acid .. | 1¼ ,, |
| Sugar .. .. | 50 ,, | | |

When jam making was commenced it was discovered that the original 4 gal. of liquid added to the cold process casks had increased to 5 gal., this being caused by diffusion of juice from the fruit. (This increase of the liquid portion by 1 gal. of fruit juice is an important reason why the liquor should not be summarily disposed of, for it will contain much flavouring matter, and should be used with the fruit whenever possible.) In view of the multifarious ways of boiling jam which are in vogue today, no apology is made for giving the precise method adopted in these studies, in order that the significance of the results may be more readily appreciated.

Twenty-seven lb. plums (or plum pulp) were weighed out and mixed with 12½ lb. juice (or water in the case of the plum pulp). Steady heat was applied to 190° F. when the pectin was sifted in. Hard boiling for one minute was followed by the addition of the sugar, and the temperature was then taken to 221° F., eight minutes being required for this. The tartaric acid was added last, and the cooled jam was filled into various sized vessels (1, 2, and 7 lb. jars).

TABLE I.

EFFECT OF PRESERVATION TREATMENT OF PLUMS ON RESIDUAL $SO_2$ IN JAM.

| *Sample.* | *Process.* | *Preservative.* | *$SO_2$ in Preserving Solution as p.p.m.* | *$SO_2$ in Jam as p.p.m.* |
|---|---|---|---|---|
| A.1 | Cold | Sulphurous acid | 1,000 | 20 |
| A 3 | ,, | Potassium metabisulphite solution | 1,000 | 19 |
| A.4 | ,, | Sulphurous acid | 2,000 | 71 |
| A.6 | ,, | Calcium bisulphite solution | 2,000 | 55 |
| B.1 | Hot | Potassium metabisulphite solution | 3,000 | 120 |
| B.2 | ,, | ,, | 1,500 | 88 |
| B.3 | ,, | ,, | 750 | 84 |
| B.4 | ,, | Calcium bisulphite | 3,000 | 157 |
| B.5 | ,, | ,, | 1,500 | 127 |
| B.6 | ,, | ,, | 750 | 86 |

Two complete boils were made on each cask of fruit and duplicate casks were available for most treatments. An abridged table of results is given above, in which for convenience of reference the same nomenclature is used as in the original article.[4]

Referring to Table I, in the cold process the use of the lower concentration of $SO_2$ has afforded a jam which is well within the legal limits for $SO_2$. The higher concentration gave a jam which contains altogether too much $SO_2$. While it is by no means safe to assume that the relationship is a linear one, if this were actually so the use of 1,500 p.p.m. of $SO_2$ in the preserving solution would give a jam with just over the legal limit of $SO_2$. The hot processed pulps afforded disturbing results, as the $SO_2$ had evidently become thoroughly well fixed on to the fruit tissues. The comparative results show the beneficial effect of the cold treatment, and although storage temperatures were comparatively high, the 1,000 p.p.m. of $SO_2$ maintained the fruit in a perfectly sweet, wholesome, and unfermented condition.

Neither the experimental results shown above, nor others obtained in further work, enable a definite statement to be made regarding the differences caused by using sulphurous acid or $SO_2$-containing compounds.

## Effects of Treatment on Quality of Jam

Although the primary concern of the studies now under consideration was with the $SO_2$ contents of pulp and jams, attention was also given to the quality of the jam produced from the variously treated lots of fruit. The jams were critically examined for the following characteristics: flavour, consistency, colour, and condition of fruit. The results of the jams from hot processed pulps were distinguished by the following features: the flavours were in all cases vitiated by definite "woody" taints (all the casks were "remades", and it is perhaps significant that no such flavours were detectable in the jams made

TABLE II.

EFFECT OF PRESERVATION TREATMENT ON FLAVOUR AND QUALITY OF JAM.

| *Sample.* | *Process.* | *Method of Preservation.* | *Flavour.* | *Consistency.* | *Colour.* | *Condition of Fruit.* |
|---|---|---|---|---|---|---|
| A. 1. | Cold. | 1,000 p.p.m. $SO_2$ solution. | Rather sweet No taste of $SO_2$. | Good. | Good, pleasant and attractive. | Fruit whole and tender. Easily spread over bread. |
| A. 2. | „ | 1,000 p.p.m. $SO_2$ (as potassium metabisulphite). | Rather sweet. No taste of $SO_2$. | Good. | Light colour, pleasant and attractive. | Flesh rather inclined to adhere to stone. |
| A. 3. | „ | 2,000 p p.m. $SO_2$ solution. | Sharper than A. 3. Trace of $SO_2$ detectable. | Tendency to weep. Not so sound as A. 1 and 3. | Do. | Skins tough and wrinkled. |
| A. 4. | „ | 2,000 p.p.m. $SO_2$ (as calcium bisulphite). | Sharper than A. 3. Trace of $SO_2$ detectable. | Very poor set. | Do. | Skins and flesh tough; flesh clinging to stones. |

from cold processed plums); the taste of $SO_2$ was noticeable in all samples, but the "set" was generally adequate; the finished jam was dark in colour, and this factor, combined with the completely disintegrated state of the fruit, did not conduce to an attractive product; the skin portions were very tough in the higher concentrations of $SO_2$, and, indeed, in the case of fruit preserved with 3,000 p.p.m. of potassium metabisulphite, thorough and painstaking mastication was necessary to prepare the portions for the further processes of digestion.

The data for jams made from cold processed fruit are given in Table II.

Three points of interest arise from the data in Table II: In the first place, the taste of $SO_2$ was quite definitely noted in samples A. 4 and A. 6, where the actual $SO_2$ content was 71 and 55 p.p.m. respectively. The detection of the flavour of $SO_2$ in the latter case is of especial interest as the amount present is not greatly in excess of that laid down by the regulations. Secondly, the higher concentration of $SO_2$ used in samples A. 4 and A. 6 are correlated with a poorer "set" in the finished jam. Again, the use of calcium bisulphite has further reduced the jam consistency, and although the data are by no means sufficient in themselves to allow of dogmatic generalisations, they may perhaps have some special significance in view of Potter's reference in his article in FOOD MANUFACTURE of April, 1934, to the occurrence of weak jelly strength when calcium bisulphite is used with certain fruits.

In the third place, the condition of the fruit was related to the concentration of $SO_2$ in the preserving solution. The 1,000 p.p.m. solution had in no way hardened the plum skins or tissues, whereas the strong sulphurous acid solution had effected very considerable toughening in both skin and flesh. Some of the fruit had contracted into small hard centres of skin and tissue, and were not suitable for spreading.

## Distribution of $SO_2$ in Various Tissues of Preserved Plums

As a side issue from the main experiments it was considered important to test the truth of the statement which has often been expressed that the major part of the $SO_2$ present in preserved plums resides in the stones. Plums taken from the two strengths of $SO_2$ solution some five months after the jam-making operations were carried out were dissected as quickly as possible and the various tissues analysed for total $SO_2$. Some of the results obtained are given in Table III.

TABLE III.

$SO_2$ DISTRIBUTION IN PRESERVED PLUMS.

| *Tissue.* | **1,000 p.p.m. $SO_2$.* | *1,000 p.p.m. $SO_2$.* | **2,000 p.p.m. $SO_2$.* | *2,000 p.p.m. $SO_2$.* |
|---|---|---|---|---|
| Stones ... | 320 | 520 | 700 | 985 |
| Skins ... | 144 | 110 | 280 | 414 |
| Flesh ... | 163 | 137 | 166 | 314 |
| Liquor in cask | 180 | 178 | 210 | 538 |

* Indicates that samples were taken from a cask which had been opened and some material removed five months previously.

In all cases the stones do contain the largest percentage by weight of $SO_2$. The proportions in the skins and flesh are not similarly distinguished in the plums from the two strengths of $SO_2$; the skins contain less than the flesh in less concentrated solutions, but the reverse is the case in the 2,000 p.p.m. solution of $SO_2$.

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[1] Barker, B. T. P., and Grove, O.: *Long Ashton Research Station Annual Report*, 1924, p. 97.
[2] Potter, H. W.: FOOD MANUFACTURE, July, 1933.
[3] Potter, H. W.: FOOD MANUFACTURE, April, 1934.
[4] Charley, V. L. S.: *Long Ashton Research Station Annual Report*, 1934, p. 255.

# The Canning Industry in SOVIET RUSSIA

*A peasant woman of Soviet Russia.*

By LOUIS SEGAL, M.A., Ph.D.

A CLIMATE with such extreme varieties as Soviet Russia presents some immense problems in food preservation and storage. Politically and sociologically Russia is to a large extent dependent on her own food supplies. In 1917-18 the defeat of her armies and the succeeding revolution were directly occasioned and decided by the food production and transport. The leaders of the present régime are very conscious of this fact.

In pre-war Russia the canning industry consisted of not more than a hundred small plants, all of the home industrial type. Their total output did not exceed 80 million cans per annum.

The canning industry to-day is controlled by three central boards—meat, fish, and canneries—the latter controlling the output of fruit, vegetables, etc. The total output for 1933 was estimated at 723 million cans.

The detailed figures of production are as follows:

| | | |
|---|---|---|
| Meat .. .. .. | 105 | millions. |
| Fish .. .. .. | 180 | ,, |
| Fruit and vegetables .. | 360 | ,, |
| Milk .. .. .. | 4 | ,, |
| Tomatoes .. .. | 74 | ,, |
| Total .. | 723 | ,, |

The second Five Year Plan has laid great stress on the development of the canneries. Many of the factories are finding it necessary to instal new plant to keep pace with the ever-growing demand. Old factories will be entirely modernised by 1936 if the ambitious Government programme is realised.

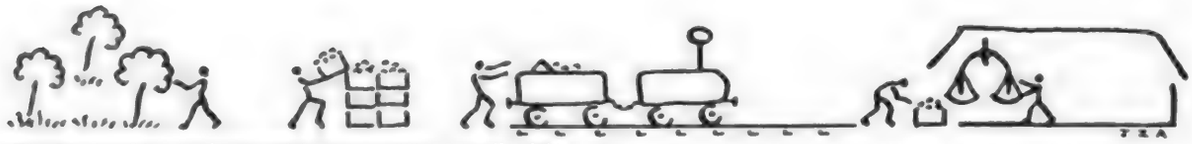
After the amazing growth of the meat industry during the last five years this is not an impossibility. During 1934 seven new plants, with a total output of 104 million cans, were put into operation.

## New Technicians

A grave difficulty which hampered previous expansion was the lack of technicians. Europe and America were searched for instructors, with the result that to-day the industry can draw its technicians from a new generation of young Russian engineers from the technical schools. Peasants from Siberia, gipsies from the Crimea, Cossacks from the Don now provide a new class of skilled artisan.

The Control Board is very satisfied with the rapid growth of skilled labour, but they have far to go before they assume the proportions of a menace to British markets. There are one or two exceptions to this.

**The Moscow Meat Plant, which was designed in Chicago by the best American specialists with the participation of Soviet engineers.**



*The Canning Line (with acknowledgments to Miss Joan Z. Atkinson.)*

Tomatoes, for instance, are a product which, with the extension of the plants in the Caucasus and Crimea, have placed this branch of the industry on a keen competitive basis with the rest of the world.

A plant of especial interest is the recently opened factory producing, entirely, hermetically-sealed glass containers. It is the first of its kind to operate on a large scale in the world. The pack is used for the higher-grade products of fruit and vegetables. It is also used for caviare.

The actual pack has a continuous thread metal cap closure. This closure incorporates a valve which allows gases to escape in processing without losing its high vacuum. Although the valve device opens under internal pressure, external atmospheric pressure causes an immediate automatic closure. This plant is situated at Ordjonikidze, in the Caucasus.

## Huge Production Increase

A remarkable development has been made in the fishing industry. As late as 1928 only four fishing canneries were in operation. The Soviets, realising the potential value which was lying unexploited, drafted emergency decrees. To-day over fifty plants of various sizes are in operation, with an output of approximately 180 million packs per annum. The model plant of the Astrakhan Fish Packing combine on the Volga produces 80 million cans per annum.

This sudden and almost incredible increase is most significant. Such phenomenal increases in production are not isolated instances. Cost what it may, the workers and Shock Brigades, as they are called, will be rushed from centre to centre, working double shifts, and without asking a kopek increase in salary. And the labour is not compulsory. I have seen a whole train-load of workers, men and women, laughing and joking as though on a holiday trip to the coast or country, set out from their suburb to carry out a day's work without pay on their free day. (One day in six is free.) Always intensely religious, the old peasant class, in its newly formed industrial sphere, finds physical and emotional outlet in Communism.

It was something of this collective zeal which Henry Ford had in mind when he instituted prayers in his factories. He failed because he could find no religious "lowest common denominator". The Soviets seem to have succeeded in harnessing the spiritual and physical in their industrial workers to-day. *That is the most significant feature of modern Russia's industrial development.*

Another large and important concern is the Guriev combine. It is situated in the Northern Caucasus. The Krimskaya station is said by experts to be the largest and latest plant of its kind in Europe. From here the export trade is to be developed. The present output of this plant is 86 million cans per annum. The operation of these later plants is the last word in mechanical efficiency; this does not always extend to the operatives. Skilled labour until recently has been almost unobtainable. The Soviets have had to draw on the vast unskilled but enthusiastic peasant masses. They are to-day many of them first-class technicians and operatives.

**Delivery of raw materials, vegetables and fruit, to the canneries in the early days of Soviet production.**

## American Lines

The working of the average modern Russian cannery is based on American lines. They have, however, incorporated several improvements in design and operation. The Krimskaya plant is connected by a light railway with the centres where the fruit or vegetables are stored. This differs from the old method of a few years ago, shown in the illustration.

The fresh products are received and enter a straight-line process. Firstly, they are weighed and graded, next peeled and washed, and they pass out on to a straight-line feed to the preparing room. A special feature is made of the flooring in these plants. It is acid-proof, and has a non-slip surface. The composition of these floors, a leading Soviet engineer told me, is a substance non-absorbent in character, the surface consisting of

a vitrified synthetic silicate.

All the larger plants and many of the smaller ones have their own can-making plant. After the product is cut and sliced and is ready for packing, the cans from the foundry join the line. Numbers are checked automatically. Each can is stamped with grade or type. The lids enter the line at the next stage. A large reserve feed is held for nightwork, when the tin foundry will no longer be working, or in the event of a breakdown or stoppage it can be operated without loss of time.

Carrots being tinned in Cannery No. 2, "Sickle and Hammer", at Simpheropol, in the Crimea.

### Standardisation

The Russians employ two standard sizes for almost every product. The pack on leaving the grader is placed on conveyor belts which run parallel to the sorting tables. At the end of the convoys the products pass through a chute mounted on a swivel. A single skilled operative controls the size and quality of the products going into the cans. This selection is carried out by opening and shutting a series of gates which shunt the product on to the canning line taking its particular grade—thus saving a great deal of time.

The cans when filled pass on into the cooking lines. Generally there are twelve of these lines in the larger plants, power being obtained from two 300 h.p. oil-burning boilers and one gas boiler. The temperatures are automatically controlled. A feature of particular interest to English canners is that all equipment is standardised. Fruit trays are one important example. These are found to effect a great saving.

### Maintenance and Hygiene

Cleanliness and hygiene are most stringently observed. A system of fines, ranging from a few kopeks to a long term of imprisonment, may be imposed on any worker found neglecting cleanliness in his particular job or department. In the preparing rooms the working day begins with an inspection of hands. Free facilities for manicure are provided. Anyone knowing the old Russian habits will realise how necessary this is.

The crab canneries are carrying out continuous tests for improving hygiene. The Kamchatka canneries include large experimental laboratories staffed by leading bio-chemists. A solution of hypochlorite is used for sterilising plant and equipment. Wooden or soft-surface equipment, once in general use, has now been discarded as dangerous and impracticable. Metal equipment is used throughout the various processes and a hard-surface flooring, already described, is employed.

Each factory runs its own workers' restaurant and club-room. Every factory runs a newspaper. This comprises a broadsheet, which is pinned on the club-room wall. If Ivan has been neglecting his production figures he is censured by his fellow-workers. Should even the director fail in any particular branch it will be plainly pointed out to him by those working under him through this medium. The early chaos which surrounded the industry and produced such pessimism among the foreign technicians is now happily a thing of the past.

## BIOCHEMICAL RESEARCH IN INDIA

THE *Journal of the Society of Chemical Industry* has published in a recent number a report on the *Annual Review of Biochemical and Allied Research in India* for 1933, which was issued by the Society of Biological Chemists in India.

Research relating to Indian agriculture, foods and conditions in general is considered in this review. The subjects are widely dispersed, the cucumber and its effect upon digestion being among the most interesting. The cucumber receives favour as an aid to digestion in splitting up protein matter, but as it increases the virulence of cholera the particular ensyme it possesses is blamed for supporting the protein-splitting cholera germ in the production of more toxic products. This seems to explain the Indian habit of associating the cucumber with cholera.

# SAFETY in Food Canning

By F. HIRST, M.Sc., A.R.C.Sc.,

Director, University of Bristol Research Station, Campden, Glos.

A FEW months ago four people died in London from "botulism," resulting from the consumption of nut-meat brawn preserved in glass, and on the day following that on which the inquest opened the majority of the daily newspapers had large headlines about the dangers of botulism in canned vegetables. Fortunately when the inquest was resumed on the following day it was made clear that the case was not one of *canned* food poisoning, and that the danger of botulism from the consumption of English canned vegetables was infinitesimal. This was fully reported in the national press, and the reputation of the canning industry was restored. Nevertheless, the seriousness of the case and the publicity given to it may have caused unnecessary worry and apprehension in the minds of many canners, and for this reason it may serve a useful purpose if the scientific facts in relation to the occurrence of botulism were stated in a simple form.

It is necessary first of all to make it clear that cases of food poisoning of this type are extremely rare, and are in no way associated with tin cans as distinct from glass jars or bottles. In fact, the only two outbreaks of botulism in the British Isles happened to have been associated with glass-packed goods; the first was from a jar of wild duck paste consumed at Loch Maree in Scotland in 1922, and the second was the recent case where the product was bottled nut-meat brawn. It is true to say, therefore, that *there has not been a single recorded case of botulism from canned foods in this country*. This is a record of which the British canning industry may well be proud, and indicates the care with which the canners of this country have sought advice on the scientific control of processes and the conscientious manner in which they have put this advice into practice. In discussing the previous cases of botulism reported in 1922, the Chief Medical Officer of Health pointed out that the extreme rarity of cases of food poisoning of this type tended to lend an air of mystery to the disease, and to give the actual outbreaks more publicity than they warranted from the public health standpoint.

Botulism is not a disease associated solely with canned or bottled products, as it was first recorded in sausage meat, and many of the Continental cases have had their origin in this class of foodstuff. It is now, however, almost as rare in such products as in those which have been preserved in containers. The causative organism—*Bacillus botulinus*—occurs mainly in the soil, and is not, in itself, poisonous. When it gains access to foodstuff, however, it may under suitable conditions give rise to small quantities of a highly poisonous toxin, and this is the substance which is responsible for illness. Although spores of *B. botulinus* are highly resistant to heat, the sterilisation processes recommended by scientific laboratories leave a large margin of safety and ensure that the spores, if present in the first place, will certainly be destroyed so that the toxin cannot be formed.

The whole of the problem regarding the resistance of the spores of *B. botulinus* to heat was worked out in great detail at the medical colleges of several American Universities, and the results showed that there was a great variation in the heat resistance of different strains, the most resistant requiring about five to six hours at boiling point to bring about its destruction. At temperatures considerably above boiling point, however, the time of sterilisation could be reduced to a comparatively short period, and the American workers pointed out the necessity of using temperatures exceeding that of the boiling point of water. These high temperatures are not necessary in the case of acid substances, such as fruits, but are required for vegetable, meat, and fish products.

Although safe methods of processing were available, they were not always used, and up to the year 1925 the canners in California were troubled with occasional cases of the disease arising from the consumption of commercially packed articles. They then decided to safeguard their own industry by asking the State Board of Health to introduce legislation making it compulsory for all canners of vegetables, meat, and fish to employ a certified process man, to use the correct equipment, and to sterilise for the times and temperatures which were known to be adequate. Since these regulations came into force nearly ten years ago there has not been a single case of botulism in cans packed under these regulations in America, in spite of the output reaching several thousand million cans annually. This is a wonderful proof of the safety and efficacy of the processes used.

The vegetable canning industry in England is very largely of recent growth, and in its development has kept in close touch, through the Campden Research Station, with the latest scientific developments. Similar processing times and temperatures to those employed in California are in general use throughout the whole of the vegetable canning industry of Great Britain, and the entire freedom from outbreaks of botulism in foods packed in cans is a tribute to the canners themselves, and to the success of the methods recommended.

Bottlers of vegetable products have also been quick to recognise the importance of sterilising at high temperatures, and have adjusted their methods accordingly. It is easy, however, not to realise the almost infinitesimal danger lying in the older methods of sterilising at boiling point, and the present outbreak in a factory where every care was otherwise taken in the bottling process in a case where the unfortunate odd chance of one in many millions, lying hidden in the older methods, turned up.

The recent outbreak, distressing as it has been in caus-

ing the death of three people, may, however, serve one useful purpose, as the publicity given to the case should make any packers of vegetables, meat, or fish products who may still be using the older methods change over to the newer processes, thus removing completely the last minute element of danger.

The packing of foodstuffs by the latest methods in the modern hygienic type of can is a means of preserving fresh foods over long periods in a palatable and nutritious state. The value of canned foods is recognised by many members of the medical profession, and by dietetic experts throughout the world, and it would be a pity if the recent cases of botulism—which were not associated with the tin can—should in any way deter people from enjoying their customary cans of peas or other vegetables. Thirteen years have elapsed since the previous case of botulism in this country, and if food packers take the necessary precautions there appears to be no reason to suspect that any further cases will arise in the future from the consumption of processed food.

## *A Note on*

# FOOD POISONING

### *By Dr. H. B. Cronshaw*

THE following comments do not pretend to be anything more than casual observations on a wide and complex subject. Nevertheless, they bring out several points which are of some importance in view of the publicity which is given from time to time to illnesses which are alleged to be caused by food poisoning and which are frequently associated in the public mind with canned foods. Although it is almost invariably shown that canned foods are not in any way involved, the damage has been done, so that it is a good corrective to seize every opportunity of helping to spread the true facts concerning food poisoning, so far as they are ascertainable.

With regard to botulism, Mr. Hirst once more emphasises the fact (in an article published on another page of the present issue) that there has not been a single recorded case of botulism in this country from canned foods, and since the American canners adopted the safeguards laid down by legislation ten years ago, there has not been a single instance of botulism among the thousands of millions of cans packed each year in that country. What more striking proof of the safety of canned foods could one possibly desire?

On this question of food poisoning, we find much confused thinking and not a few exploded myths. In the old days infinite harm was done by the spread of harrowing reports of so-called "ptomaine poisoning" attributed to canned foods. Nothing could have been further from the truth. As a result of careful investigations the theory of ptomaine poisoning had to be abandoned. It was shown that outbreaks of poisoning often occurred after the consumption of apparently normal food, in which the advanced putrefaction necessary for the formation of those complex chemical bodies known as "ptomaines" was entirely absent. Such putrid matter is long past the stage at which anyone would contemplate using it as food. Moreover, ptomaines are only poisonous when injected into the body and not when taken by the mouth. In America, Dr. Rosenau and his colleagues have been unable to find any evidence that ptomaines can produce illness in human beings when taken by the mouth. There is therefore no scientific support for the theory of ptomaine poisoning.

The general subject of food poisoning has been very seriously tackled over the last twenty years by a number of prominent physicians and bacteriologists in America, among whom may be mentioned Dr. Page, who investigated all cases of illness alleged to have been caused by canned foods, and Dr. Rosenau, head of the Department of Preventive Medicine and Hygiene of Harvard University Medical School, who worked under the National Research Council with the assistance of six prominent scientists.

As a result of this work, Dr. Rosenau came to the conclusion that because of their methods of preparation, canned foods are not subject to contamination by bacteria as in the case of foods stored in bulk and for that reason are "*the safest foods that come to your table*".

Then, again, Dr. Jordan, of Chicago University, and his group of investigators have gone deeply into the subject of food poisoning. They, too, agree with Dr. Rosenau that outbreaks are rarely caused by canned foods unless contamination takes place after the can is opened.

In this country the influence of Savage led to bacterial food poisoning being regarded, not as a toxæmia, but as an infection due to certain definite organisms of the Salmonella group. This position was, however, rendered untenable when it was found that in many outbreaks Salmonella infection could not be demonstrated. Recently the pendulum has swung back to the toxæmia theory, for Dr. Jordan has shown that many other groups of bacteria besides Salmonella are able to form toxins giving rise to acute gastro-intestinal irritation if grown under suitable conditions. The general conclusion seems to be that, while some outbreaks are due to active infection with Salmonella, many others are caused by consumption of poisonous substances formed in food by the growth of various other types of bacteria. Thus it seems clear that *no food* in which active growth of bacteria has occurred can be regarded as altogether safe for human consumption.

The importance of this conclusion lies in the fact that it provides no reason for regarding canned foods as being any more liable to these dangers than the rest of foodstuffs. Indeed, it would seem that canned foods are very much safer in this respect—that they are in truth the safest foods that come to your table—because they have been carefully cleaned and sterilised and sealed in protective containers out of contact with every possible source of contamination.

# THE HOME CONSUMER

## SOME REFLECTIONS AND SUGGESTIONS

By Mrs. Charles Marshall, M.B.E.

*Mrs. Marshall has seen the rise and fall of many excellent manufactured foodstuffs and has given much thought to the question as to why many faded out of existence for no apparent reason. We should be very interested to have our readers' view on Mrs. Marshall's suggestions.*

ALTHOUGH THE housewife and small consumer make no direct deal with the manufacturer, they are in reality his surest customers, for on their verdict, particularly that of the housewife, rests the ultimate success or condemnation of his various household products. No doubt this unacknowledged influence is not, to him, in evidence, but all the same it exists, and is a considerable factor in relation to the sale of manufactured commodities.

### Value

There is no more loyal upholder of some favoured brand of foodstuffs than the enthusiastic housewife, but if once the idea gains ground that she is not receiving the expected value for her money, no consideration will induce her to make further purchases. She is not concerned with the commercial aspect of her selection; she knows nothing of the manner of its production; but she is out to obtain the utmost worth for her outlay, often limited by narrow means; and telling advertisements, attractive wrappings, or even the inducement of added gifts will not draw her back to her original choice if she suspects a lapse of intrinsic values.

### Quality

Probably the advantage of steady allegiance on the part of small consumers has not occurred to the mass-producer. Naturally his point of view would be the necessity of influencing a wide general public by the means of decorative cases and a display of the benefits to be derived by a continuous use of his special article. This constant urge is deemed a sufficient means to ensure all sales being kept up to the required standard. Perhaps, if the producer had a more widespread acquaintance with the inside of the ordinary domestic kitchen, he would realise that quality, accompanied by moderate cost, is the only lasting advertisement.

### The Package

Appearance, no doubt, is of importance in increasing sales, especially with some new venture, but if the recognised quality does not come up to the degree claimed for it, or fails to keep up to the requirements, no elaborately decorated exterior will prevent it from losing ground eventually with the housewife. In the daily routine of a kitchen, where meals are of the first consideration, no time is available for the admiration, merely on account of its artistic appearance, of the bare package. It will be torn off as quickly as possible and consigned to the dustbin. It must, therefore, suggest itself to the intelligent consumer that expensive wrappers are in some measure waste of money; useful for enhancing the appearance of a shop window, but scarcely an asset to the purchaser. She would rather have a plainer covering and an improved article or pay less for it.

### Directions

Another point which presents itself, from the view of the small consumer, is the need of rather more detailed directions for dealing with many of the prepared articles of food. Recipes there are in abundance, but here recipes are often misleading and are valueless without definite instructions to those who have not a very extensive knowledge of cookery. It would be invidious to single out any special foods prepared ready for mixing. But where extras are to be added to the original preparation, regard is not taken into account that these may affect the recipes or directions and cause a disproportionate distribution of the ingredients, or an excess of some one ingredient. It may be argued that the regulating of quantities might be left to the judgment of the cook. If she is an expert well and good, but it is not often that adaptation of given recipes can be left to her discretion.

### Canned Foods

Some directions for serving canned foods would surely be an advantage. How to deal with the contents of the tins when opened, a few plain directions for reviving the flavour of fruits and sending these to table in a more appetising manner. Also the best method of making up tinned fish into wholesome and savoury dishes. Little seems to have been accomplished in this direction.

The housewife, of course, ought to be an expert in her duties, and it is outside the province of the manufacturer to offer to instruct her. But let him remember that he has rather spoilt her thirst for dietary knowledge by relieving her of much of her daily drudgery. She may be grateful to him, but he has deadened, if not killed, her aptitude for struggling with the ordinary culinary prob-

lems, and in return he might deliberate on her difficulties and provide her, inside or outside the packet, with instructions compatible with a sound sense of everyday cookery. After all, it is the small consumer, in the guise of the housewife, who is the ultimate arbiter of his fate!

### A Genuine Pound Cake

One further suggestion might be of moment; the introduction of certain superior manufactured articles, now practically unobtainable. There are many persons not only willing but anxious to discover, for instance, a genuine old-world pound cake. One that is guaranteed to be composed, according to the correct formula, of equal quantities of good butter, fresh eggs, and the remaining ingredients in due proportion. Where can such a cake be bought? Fancy cakes there are in abundance, but not this less showy variety. Another article which seems to have disappeared from general commerce is the unpolished Carolina rice. It has been superseded by the cleaned polished specimen, which undoubtedly does not possess the same food values or the flavour. Where, also, is the genuine butter toffee? Plain but distinctly wholesome, and eminently better suited to the young folk than many flavoured mixtures. The loss of homely preparations is often lamented by the housewife, but, as they are unprocurable, she must perforce content herself with those which are available.

With every esteem for the manufacturer this plea is entered for the harassed housewife. He has done so much to make domestic life easier that he might well add to his obligations by studying a closer and more personal note in the make-up of his wares.

## New Division of Fruit Products at University of California

On July 1 the President and the Regents of the University of California, at the request of Dean C. B. Hutchison of the College of Agriculture, divided the former Division of Viticulture and Fruit Products into two new divisions —that of Fruit Products with headquarters at Berkeley, and that of Viticulture with headquarters at the University Farm at Davis. Professor F. T. Bioletti, head of the former combined division, retired from active service on July 1 as Professor Emeritus. Dr. W. V. Cruess is head of the new Division of Fruit Products, and Dr. A. J. Winkler is head of the Division of Viticulture. Dr. Gordon Mackinney has been appointed to fill the vacancy left by the untimely death of P. F. Nichols, and will assume his duties on September 1. Other members of the staff are Dr. M. A. Joslyn, E. M. Mrak, G. L. Marsh, and L. G. Saywell.

As in the past, the main object of the Fruit Products Division will be to increase the profitable utilisation of surplus fruit crops by research, extension, and teaching in the fields of fruit technology, such as drying and processing, canning, wine making, pickling, freezing storage, fruit juice production, olive products, etc. Particular attention will be paid to the development of theoretical and applied microbiology in order to improve the quality of fermentation products.

# Book Review

## SAUSAGE AND SMALL GOODS PRODUCTION

One of the peculiarities of that section of the meat business which is concerned with the production of sausages and small goods is that it has lacked a really authoritative book dealing with the practical methods of manufacturing these goods on both a large and a small scale. We are therefore glad to announce the publication by Leonard Hill Limited of *Sausage and Small Goods Production*, by Mr. Frank Gerrard, which fulfils the requirements of the trade in that it is the most informative, up-to-date, yet thoroughly practical book on this subject that has ever been published.

Its author, Mr. Gerrard, is of course well known to everybody in the trade as the greatest authority in this country on small goods production. Besides holding the gold medal of the Worshipful Company of Butchers and the diploma of the National Federation of Meat Traders, Mr. Gerrard has had unrivalled experience from boyhood in the meat business, and after a brilliant career at the Smithfield Institute and further experience in the small goods business, he returned to the Institute to pass on his knowledge to the younger generation.

As may be expected, the book is quite unbiased and is full of sound practical common sense, coupled with the most recent technical knowledge. It is just the book for anyone who wishes to start up and maintain a profitable business. A whole chapter is devoted to the subject of costing and another section deals with cold storage. The difficult art of curing and the making-up of brine for different purposes are treated in a practical and quite simple fashion that can be readily understood by anyone.

Many recipes, together with their costing, are given, as well as full descriptions of the machinery and equipment required for the work. Another useful section gives advice about the layout of a small factory. Others deal with binders, flavourings, casings, the utilisation of waste for savoury ducks, saveloys, brawns, dripping, mincemeat, tripe, etc., and the preparation of cooked meats such as briskets, silversides, meat rolls, and pastes.

This book may be obtained from the publishers, Leonard Hill Limited, 17, Stratford Place, London, W. 1, at the price of 7s. 6d.

**Mr. W. Leonard Hill, Chairman of Leonard Hill Limited, proprietors of FOOD MANUFACTURE, enjoying a day's fishing on the River Test, near Stockbridge, Hampshire.**

# INDUSTRIAL NEWS

### The Ramsay Chemical Dinner

The Ramsay Chemical Dinner will be held this year at the Central Station Hotel, Glasgow, on Friday, December 6. Sir Thomas Holland, F.R.S., will occupy the Chair. The Ramsay Chemical Dinner, which grows in popularity every year and brings together a large number of scientists from all parts of the British Isles, is organised by the Glasgow Section of the Society of Chemical Industry, the Chemical Society, and other allied bodies, in memory of Sir William Ramsay.

Further information is obtainable from Mr. H. C. Moir, 116, Paton Street, Glasgow.

### Better Food for Britain

Government plans for a National Food Policy are taking shape and a full announcement may be expected shortly.

Following Sir John Orr's speech at the British Association, in which a national food policy was outlined, it was reported that the scheme has the approval of both Sir Kingsley Wood, Minister of Health, and Earl De La Warr, Parliamentary Secretary to the Minister of Agriculture, and that a Food Department is to be set up as a link between the two Ministries.

### Survey of Chemical Industry

An intensive investigation of the chemical industry is to be undertaken by the review division of the National Recovery Administration in the U.S.A. A study will be made of some twenty basic industries which will be used as the foundation of statistical information to be gathered during the next few months. It is intended to bring out information relative to marketing and distribution, development of new processes, and data on the obsolescence of machinery. It is also reported that the N.R.A. has created a division of business co-operation which will act as a contact between industry and the Federal Trade Commission in negotiation of trade agreements.

### Press Caps' New Factory

The contract has now been placed for the erection of the new factory building on the site of Chandos Road, Willesden, London, N.W., for Press Caps, Ltd., of 21, Gorst Road, London, N.W. 10.

### The United Steel Staff Pensions Scheme

A contributory life assurance and pensions scheme, for voluntary acceptance, has been inaugurated by the United Steel Companies, Ltd. It provides both annual retiring pensions for men at sixty-five years of age and for women at sixty, and life assurance of a substantial amount at any time up to pensionable age.

The scheme is important from the social aspect, as it is one more attempt to improve the stability of employment in the heavy industries and to show that the personal welfare of the employee has not been forgotten with the increase of size in producing units. The eligible members of the staff of The United Steel Companies, Ltd., have quickly grasped the opportunity afforded and already 99·5 per cent. have enrolled.

### $CO_2$ Equipment for the "Queen Mary"

An order has been received by Elliott Brothers (London), Ltd., electrical and mechanical engineers, from Messrs. John Brown and Co., Ltd., for twenty-four complete sets of Siemens $CO_2$ (flue gas analysis) equipment—namely, a set for each of the main boilers installed on the Cunard White Star liner s.s. *Queen Mary*. This equipment is being manufactured throughout at the company's Century Works, Lewisham, London, S.E. 13.

### Industrial Lighting

The Benjamin Electric, Ltd., Brantwood Works, Tottenham, London, N. 17, have sent us a copy of their monthly journal *The Reflector*. This journal, which is published in the interests of better industrial lighting, contains a number of illustrations showing Benjamin planned lighting in workshops, factories, swimming baths, churches, etc. An illustration of a Benjamin lighting installation in a well-known foodstuff factory is given below.

This company is mainly associated with industrial lighting in all its many phases, but information is also given of attractive fittings suitable for small lighting jobs. In addition, with the continually increasing application of light to the needs of sight in both industry and commerce, the Benjamin engineering research is continually designing and producing new equipment.

The demand for this company's products has necessitated the large and important extensions which have been made to the factories.

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After 14 years at 43, Bloomsbury Square, Richard Crittall and Co., Ltd., the well-known Heating and Ventilating Engineers, have moved to more extensive premises at Bush House. Their Associated Companies, The Magnetic Valve Co., Ltd., and The Crittall Ventilator Co., are also installed in the new offices.

The new telephone number is TEMple Bar 7777.

Benjamin Lighting Installation in a well-known Foodstuff Factory.

## New Service for Bottlers

We have received from William Hay, Ltd., 42-46, Walmsley Street, Hull, a copy of their latest publication dealing with the manufacture and marketing of non-alcoholic fruit wines and cordials.

The cover of the booklet is of red semi-stiff paper and the internal leaves of brown-coloured paper. A number of attractive labels in a variety of colours for ginger and fruit wines have been pasted inside and help to make the booklet extremely attractive. Recipes and instructions are given for the making of a number of wines with different flavours.

## The Bennett Balance

There has always been need for an accurate low-priced balance, so that the "Bennett Balance" recently introduced by the Chemical Publishing Co., 175, Fifth Avenue, New York, has aroused considerable interest.

This balance weighs up to 100 gm. and has a sensitivity of 1/100 gm. It is a rugged, compact device, less than a pound in weight and about 12 inches long. Because of its small size and weight it can be carried in a pocket from place to place where ordinary balances would be too clumsy and heavy. There are no loose weights to be lost. It has an alloy steel knife edge and a highly polished agate bearing which make for great sensitivity and durability. A special beam arrest prevents excessive wear of the knife edge and centres the latter automatically for each weighing.

## Benjamin Ward Richardson Lecture

Dr. M. T. Morgan, Medical Officer, Ministry of Health, will deliver the Benjamin Ward Richardson Lecture, at 5.30 p.m., November 12, at Royal Sanitary Institute, London, the subject being "Some Details of the System of Health Inspection of Meat and Meat Products Destined for Export, in the Great Abattoirs of South America."

▼ ▼ ▼

Operations are commencing immediately upon an important extension at Albion Wharf, Woolwich, London, S.E. 18, for the Albion Sugar Co., Ltd. The contract covers the erection of an extension to the factory buildings, the loading dock, and the storage accommodation.

The Telco Valve Position Indicator, which shows at a glance the exact degree to which the valve has been opened.

## Telco Valve Position Indicator

Telco Products, Ltd., 6, Gordon Square, London, W.C. 1, have sent us a leaflet descriptive of the Telco Valve Position Indicator, which they have recently placed on the market. This indicator enables one to see at a glance the exact degree to which the valve has been opened. It is a simple mechanical device, taking the place of the ordinary handwheel; it is sensitive and accurate in operation, and is clear and easily visible.

In any process where it is desirable to know the exact amount of oil, water, gas, or other fluid that is passing through the valves this device should be of great assistance. Once the best setting for any particular process has been determined it is possible to secure the same setting and the same result every time.

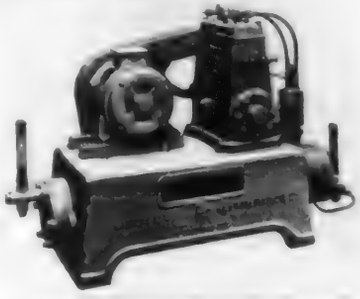
## Commercial Lighting

Crompton Parkinson, Ltd., Bush House, London, W.C. 2, electrical engineers and manufacturers, have sent us a copy of *The Crompton Book of Commercial Lighting*. This handbook indicates the more important phases of artificial illumination for commercial and industrial applications. Valuable tables are included showing the intensity of illumination which has been found by experience to permit the maximum efficiency in factories, offices, and shops in different trades. The recommendations made in the booklet are based on discoveries in a new field of scientific research which has been occupying eminent men for a number of years. The importance of this subject is very great both from the point of view of the worker and the employer.

The booklet contains a number of excellent illustrations showing efficient modern lighting in hotels, workshops, stores, shop windows, etc.

## "Auto-Cold" Compressors

Messrs. Randall, of Paddington, inform us that their well-known "Auto-Cold" compressors have now been still further improved both in general appearance and efficiency. This we were able to investigate at the recent exhibition at Olympia, where Messrs. Randall exhibited their latest model, showing the almost streamlined effect of the new outer casing. Much of the improvement has been obtained by the enclosing of all working parts, which are now effectively covered and protected, making for greater cleanliness and neater appearance, whilst accessibility is effected easily by means of a few nuts. Outstanding features of the "Auto-Cold" unit are the double-seating stop valves, multi-grooved belts, welded steel flywheel guard, sleeved compressor, high starting torque motor, heavy cast frame and anti-vibration pads. The accompanying illustration shows the extremely neat appearance of the new model "Auto-Cold."



The "Auto-Cold" Compressor.

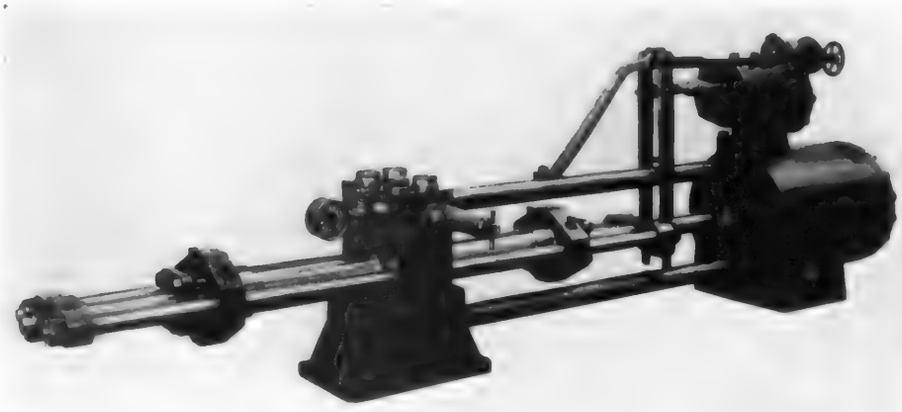
## Further Expansion of Batchelors

Messrs. Batchelors, Ltd., the well-known pea canners of Sheffield, have acquired as a going concern the business of "Chef" Peas, Ltd., Bradford. The firm of "Chef" Peas, Ltd., has been established and trading for over forty years and has concentrated in particular on the Midland and Northern markets. Another recent acquisition of Batchelors is the firm of Arthur Mason, Ltd., East Bridgford, Nottingham, canners and packers of peas, of some thirty-five years' standing.

The acquisition of these trade marks, the goodwill, and the excellent additional sales outlets will greatly strengthen Batchelors' position in this field.

▼ ▼ ▼

A new bakery under construction for Messrs. R. A. Peacock and Son, Ltd., at Ibrox, Glasgow, is now nearing completion. It is a reinforced concete building of four floors, and was estimated to cost £50,000. The most modern and labour-saving plant will be installed.



*(By courtesy of Henry Wiggin and Co., Ltd., and the Midland Counties Dairy Ltd.)*

**Homogeniser Pump embodying Monel Metal forged body.**

## Food Manufacture Equipment

The third part of this well-organised, alphabetical reference book concerning the uses of Monel Metal, Nickel, and Niconel in the manufacture of foodstuffs has just been issued by Henry Wiggin and Co., Ltd., and covers information from J for Jam to P for Pears.

A considerable variety of subjects is treated, mostly quite briefly, but in some instances, such as Kettles, Meat, and Milk, from two to three pages are devoted to them. Illustrations appear throughout this issue, which runs from page 33 to 48 inclusive. When the volume is complete, a very useful guide will have been produced, and manufacturers will be wise who keep it suitably bound for regular use. An interesting example of machinery illustrated is reproduced on this page. This is a Single Cylinder Direct Acting Horizontal Pump by Weir, which is designed to deliver 750 gallons of milk per hour.

## Salvinol

T. Harrison and Co., Burnley House, Willesden, London, N.W. 10, are now marketing an American Glycol Ether under the name of "Salvinol." It is claimed to possess inherent preservative properties, and is miscible with water, alcohol, esters, and other synthetics. It is stable, water-white, neutral, and non-toxic. With a low freezing point and a high boiling point it is stated to be an excellent diluent for essential oils, aromatic chemicals, gums, oleoresins, and other organic products, and will not deteriorate in storage. In addition, it is suitable for the manufacture of non-alcoholic flavours.

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The Clyde Navigation Trust has unanimously agreed to receive reports on plans for the extension of the Meadowside Granary, Partick, Glasgow, in order to provide a storage for an additional 15,000 tons of grain.

## New Type of Mild Steel Gilled Tube

A new departure in mild steel gilled tubing, with distinct advantages for heating, cooling, humidifying, and air-conditioning, is the "Harco" hot-shrunk tapered gilled tube.

This new type of gill has no crimp and is twice as wide at the bottom of the gill as at the outside edge, the cross section of the strip being tapered. The gill is wound on the tube at a cherry-red temperature and in cooling shrinks tightly on to the tube. Contact between gill and tube is thus perfect, there being no crimp with cavities in which dust and moisture can lie and rust the root of the gill. Efficiency or rate of heat transfer is approximately 25 per cent. greater than for a crimped gilled tube.

"Harco" hot-shrunk tapered gilled tubes are manufactured by G. A. Harvey and Co. (London), Ltd., of Woolwich Road, London, S.E. 7, and can be supplied with plain, screwed, or flanged ends in lengths up to 22 ft., from 1½ to 4½ in. outside diameter of tube with gills approximately ½ to 1⅞ in. deep, and varying in pitch from 14 to 48 gills per foot, according to diameter of tube. They can also be supplied built up into heating and cooling units, with welded joints, tested up to 2,000 lb. per square inch.

Messrs. Harvey issue an extremely useful data sheet, which they will be pleased to send on request.

## Variable Speed Gears

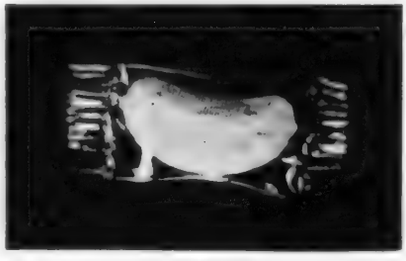
Crofts (Engineers), Ltd., Thornbury, Bradford, England, have sent us a copy of their new Variable Speed Gear catalogue. These variable speed gears enable manufacturers to obtain the advantage of being able to drive machinery at the highest possible speed, which may vary according to the class of material or work engaged upon. Infinite speed variation within a predetermined range can be obtained.

The catalogue, which is particularly comprehensive, includes full details of standard design machines, also Self-contained V.S.G. Drives, with the latest designs of variable speed pulleys for small power outputs and for ratios up to 3 to 1. Numerous illustrations showing the application of variable speed gears to machinery drives are included.

The company will be pleased to send a copy of the catalogue to anyone interested.

## Moisture-Resisting Packet

A new type of package for individual hard sweets has been developed in the plant of Henry Heide Inc., the confectionery manufacturing concern of New York. This package is fashioned from 2½ to 5⅞ in. width rolls of the moisture-resisting, heat-sealing grade of transparent wrapping cellulose by an individual machine which also fills, seals, and embosses the package to indicate the net weight and the identity of the manufacturer of its contents. The package is particularly adapted for the wrapping of irregularly shaped items, as well as the regular or angular-shaped pieces.



**An example of a small and irregular shaped piece individually packed.**

*Management, Planning, and Control*, by A. G. H. Dent (published by Gee and Co., at 10s. 6d.), is a comprehensive survey of the accounting and statistical methods necessary to the running of a business on a scientific basis. The book shows how the best use may be made of the data available in formulating policy and as a help to sound judgment. The text is illustrated throughout by actual examples from the accounting system of companies in this and other countries, while there is also a chapter on the trade cycle.

## Fire-proofing Composition

At the recent Shipping and Engineering Exhibition we noticed a fire-proofing composition under the name of "Porcella", made by Porcella Products, Ltd. It is manufactured in England and is prepared for application to all classes of timber and other combustible materials, and heavy canvas.

"Porcella" is supplied in white, broken white, or battleship-grey colours only, and when dry leaves a matt surface. It is intended as a primary coat with fire-resisting qualities and a preservative for timber. It can be covered with oil paints, enamels, etc., which it is claimed, in the event of fire, burn off, leaving the "Porcella" coating underneath.

A descriptive leaflet gives particulars and illustrations of tests. "Porcella" composition is being used extensively on the *Queen Mary*.

## A "Two-Lemon" Package

A good example of packing ingenuity is provided by the E-Z Squeeze pack for Lemonina, an American true fruit powder. A "two-lemon" package was obtained by cutting the neck and shoulder from a collapsible tube, after which the tube was pinched in the middle, resulting in a simple, inexpensive, two-compartment container. By devising a method of shearing the ends of the filled tube—in such a way as to pinch off the metal—a closure was effected which remains tight. By shearing it at right angles to the centre "pinch" a tetrahedral structure was formed which has relatively high rigidity, causing the sheared end to open into practically a square when the ends of the sheared part are pressed together.

A "Two-Lemon" Package, a description of which is given above.

## New Metallisation Booklet

Metallisation is familiar to most of us now, though its widely increasing uses may not be so well known. The very attractively produced booklet just issued by Metallisation, Ltd., therefore comes very opportunely, since it not only describes but illustrates very effectively a great variety of applications.

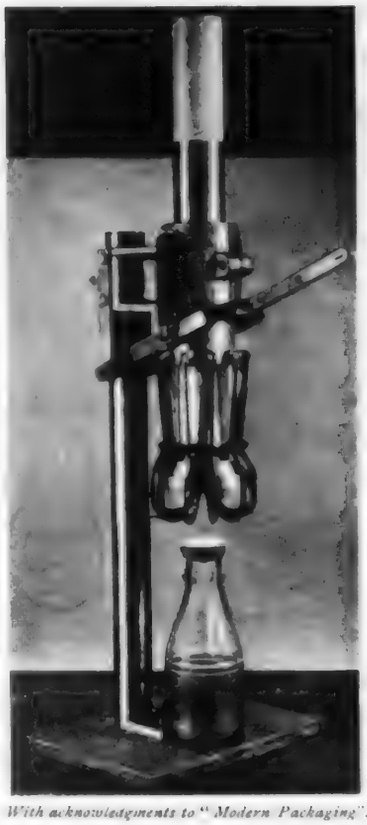
Corrosion takes such a heavy toll of metals that every method of protection against it is worthy of careful consideration. In the case of food manufacture tin coatings have long been used, and aluminium coatings applied by metallisation are very often substituted, with the advantage of increased hardness. Heavier coatings of tin can be attained by metallisation, it is claimed, than by ordinary tinning process. Nickel, another resistant metal for foodstuffs and chemical manufacture, can also be applied by this means. Very large vessels are commercially treated, as the illustrations show, and the intricacies of internal coils and fittings are readily overcome.

It is some time since we first examined the possibilities of this process, but the progress made since then is undoubtedly great. The British Oxygen Co., Ltd., have been appointed sole selling agents for metallisation plant. Metallisation work is still done by Metallisation, Ltd., at their works at Dudley.

## New Milk Bottle Hood

A universal cover-all milk bottle hood made of pliable composition material, which has sufficient resiliency to permit it to be stretched over the top of a milk bottle and yet stiff enough to cling to the bottle and not come off under usage has recently been developed by J. R. Gammeter, a consulting engineer, of 680, North Portage Path, Akron, Ohio, U.S.A.

The hood is airtight and milk-tight and only one size is necessary as it will adjust itself to fit many sizes and shapes of milk bottle tops. It may be used with or without the paper disc. The bottle hoods may be made in any colour.



*With acknowledgments to "Modern Packaging".*

A bottle hood applying machine with capacity limited only by the speed of feeding bottles into it.

The hood has also been made in Pliofilm and may be applied to bottles, using the same applying machine as for the composition hoods. Once the hood is applied it cannot be taken off without destroying it and cannot be reapplied, thus making the bottle tamper-proof. It is necessary to use the paper disc with the Pliofilm cap or hood, but it is not necessary to print the Pliofilm cap, inasmuch as the printed paper disc may be read through the transparent material.

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Owing to increased business George Cohen, Sons and Co., Ltd., have built new showrooms for their second-hand machinery department at Wood Lane, Shepherd's Bush, London, W. 12. From this address the machinery business in London and Southern England will in future be conducted. Customers who have been in the habit of writing on machinery matters to 600, Commercial Road, London, E. 14, are requested to write in future to Wood Lane, Shepherd's Bush, London, W. 12.

# CANNED VEGETABLES

## SOME COMMON TROUBLES

IT HAS been said that "success comes in cans—not in can'ts", but the pack which is to be one hundred per cent. successful must not only be satisfactory when packed, but must also stand the test of time. It is of little use paying attention to the best varieties of vegetables for canning, or to the details of grading, if the pack will not retain its freshness of flavour and appearance.

From the point of view of the process required for sterilisation, it is correct to say that fruits are more easily dealt with in the factory than vegetables; but with fruits, as canners know to their cost, there is the type of trouble that produces "hydrogen swells", which causes serious losses to canners in this country if certain types of fruit are stored from one season to the next. Fortunately, owing to the *p*H being higher—*i.e.*, less acid—vegetables are not subject to this kind of trouble. On the other hand, certain biological changes take place in canned vegetables on account of their less acid nature, such changes being unknown in fruits.

It is not intended in this article to discuss in detail the bacteriology of canned vegetables, but to consider the various types of spoilage or deterioration and to give some idea of how the cause may be located.

### Canned Vegetables

Deterioration and spoilage in canned vegetables may be conveniently divided into two main classes. In one, the cause is not due to any biological action, whereas, in the other, bacterial development is the cause. Of bacterial spoilage there are two types—in one the ends of the cans remain flat, while in the other the ends are swollen, due to pressure of gas inside the can. Before passing on to a consideration of these various types of spoilage, it will be as well to indicate first how the pack can be tested commercially. Obviously some method of "forcing" which will show up, within a few days or weeks, those faults which would take three or four months under normal storage conditions to develop, will be of the utmost use to the canner. By such means he will be able to assess roughly the standard of his pack before it passes into the hands of the distributors.

### Testing the Pack

In addition to opening up for immediate inspection a few cans from each day's pack, a further number taken at intervals throughout the day's run should be put on one side for forcing. In the U.S.A. some canners put aside as many as two cases for this purpose, but in practice about one can in every 2,000 or 3,000 cans is all that is necessary. These cans should be clearly labelled with the date and time of day; this latter is important, since occasionally the first sample taken in a day's run may be less stable than one taken later, probably owing to some of the contamination in the plant which has accumulated overnight having been dissipated as the work goes on. Thus if the first can taken off in the day were found to spoil, but later cans were found to be sound, the inference to be drawn is that the plant was not well washed down before starting up—a very common cause of trouble!

Samples for forcing should always be taken in duplicate. One of these should be placed in an incubator at 55° C. (132° F.) and the other in an incubator at 37° C. (99° F.). The method of examination of these will be given later under the various types of spoilage.

### Non-Bacterial Spoilage

When the cans from each incubator have been tested bacteriologically, if such is necessary or desirable, the contents should be turned out into a clean glass dish and examined for colour, flavour, smell, and clarity of the brine. The container itself should also be examined carefully for any corrosion or discoloration. The main function of the 55° C. incubator is in connection with bacterial spoilage, but it is also a useful means of showing up the presence of foreign flavours and cloudy deposits in a short space of time. Slight metallic contamination is usually very much more pronounced after incubation at 55° C. than before. Proteins and other matter which will eventually be thrown out of solution also make their presence shown quickly under these conditions.

The amount of sediment and cloudiness of canned vegetables is dependent to a marked degree upon the hardness of the water used for the brine. Very soft water may have the effect of producing a cloudy covering liquid and mushed appearance, while very hard water will cause turbidity if the amount of temporary hardness is considerable, at the same time causing a hardening of the skins, which no amount of boiling will correct. A poor grade of salt may also produce a similar effect[1], and over-mature vegetables may do the same.

A few years ago in the U.S.A. certain off-flavours in canned vegetables, and particularly canned peas, were traced to small amounts of organic bodies extracted from weeds harvested with the vegetables. Another type of off-flavour was found to be produced in canned peas by an enzymic activity which was caused by bruising the peas in the viners. Such off-flavours as those mentioned above also appear to be accentuated by incubation, the reason probably being that the objectionable flavours, which may be almost undetectable when first packed, are leached out during storage.

### Spoilage by Development of Bacteria

It was mentioned above that bacterial spoilage may occur in cans, the ends of which remain flat, or the ends may become distended. It is always advisable to have

the incubated cans examined by a bacteriologist when there is any doubt as to the presence of spoilage organisms, and in the event of epidemic spoilage it may be advisable to call in a bacteriologist even when there is no doubt that spoilage has occurred. Very often, however, from careful examination of the incubated cans, it is possible for the canner himself to diagnose the trouble and to put his finger on the probable cause.

If the cans in the 37° C. incubator show signs of swelling after a few days it should be ascertained whether the other cans taken on the same day are also swelling. If they are they should be opened up and the seams examined both at the canner's end and at the can-maker's end. If there is any indication that either is faulty in any way this may be confirmed as a general rule by a bacteriological examination. Esty and Stevenson[2] have shown that the bacterial flora of cans spoiled through infection due to leaky seams is usually very mixed, whereas if the spoilage is due to under-sterilisation the cultures obtained are mostly pure.

If all the can seams are satisfactory, the trouble is certain to be under-sterilisation, which may be due either to a normal process having been given to questionable raw material, or to insufficient time or temperature being given to sterilise even clean material. When vegetables have been under-sterilised it will usually be found that the organism causing the spoilage is not only present in almost pure culture (unless the under-sterilisation has been very gross), but also that it is the same organism which has developed in each individual can. A bacteriological examination of the spoiled cans will therefore often confirm the cause of the spoilage.

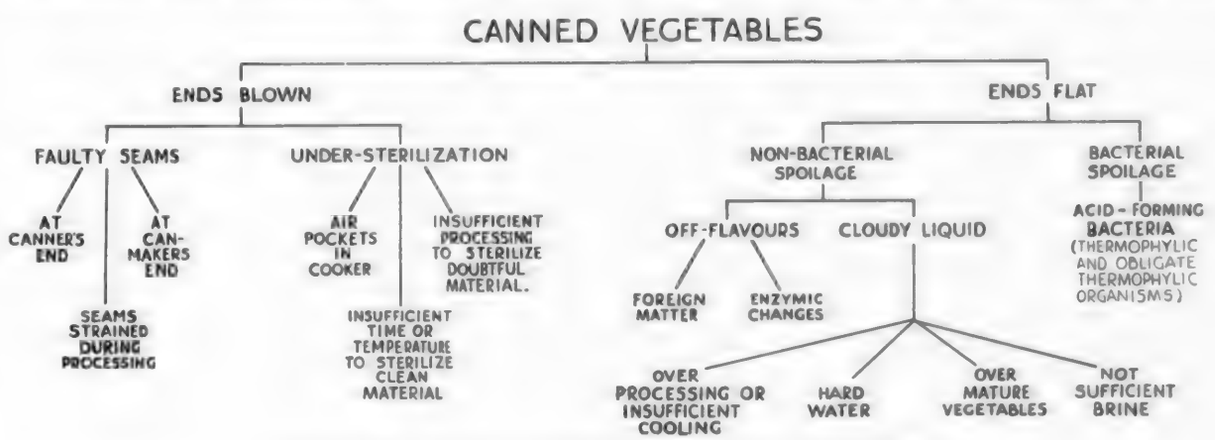
While dealing with those types of organisms which cause the cans to swell, it should be mentioned that most reputable packers of canned vegetables in this country and abroad follow the practice of storing all cans either in cases or loose on boards for a period of about three to four weeks. The cans may then be examined by the operator in charge of the labelling machine and any "blown" cans removed. Under average conditions the number of cans removed in this way may reach 2 per 1,000, and anything in excess of this amount should be regarded as abnormal. This storage prior to labelling is a good practice, but is unfortunately a costly one.

## Pressure Strains

There is another cause of "blown" cans, which may sometimes be rather obscure, since it may occur in cans which have been closed perfectly at both ends, and adequately sterilised. It is caused through seams which have been strained during the processing, and is more liable to occur with the larger sizes of cans. The best way of preventing this trouble is by the use of compressed air in the autoclave, but in those factories where this is not available, undue strains may be prevented by very gradually releasing the steam, at the same time maintaining the pressure by means of water until cold. There are now many types of automatic pressure cookers and coolers on the market which automatically correct these pressure strains.

## Flat-Sour Spoilage

So far those types of spoilage which cause a swelling of the cans have been dealt with, but in addition to these there are types of spoilage caused by bacteria in which, outwardly, the cans appear perfectly normal. The "flat-sour" organisms belong to this class, and, as the name suggests, the vegetables develop an acid taste, but no gas is produced. Most of the so-called flat-sour bacteria grow best at a temperature of about 55° C., but they can develop at a much slower speed as low as 37° C. Incubation of factory samples at 55° C. for a week will usually show up any flat-sour contamination, and although, if the incubated samples do not stand the incubation well, it does not necessarily mean that the pack will develop the same trouble, the probability is that a hot summer would ruin it. If flat-sour spoilage occurs in the incubated samples, precautions should be taken to see that all stocks are stored at as low a temperature as possible, and in order that the source of the trouble may be removed the whole plant should be washed down very carefully with cold water, particular attention being given to the blanchers and all tanks and pipe lines with which the brine comes into contact. By this means the organisms which are in the plant are flushed out. This is the best means of ridding plant of infection, since most of the organisms which cause souring of canned vegetables are very resistant to heat, and




**A Diagram illustrating the classification of Canned Vegetable Spoilage.**

when the plant cools down to about 50° C. the spores will develop rapidly.

The development of an acid reaction and a sharp taste in canned vegetables has possibly been misunderstood by some canners, on account of the free use of the term "thermophyle". A number of organisms have been isolated which are responsible for this action, and although it is true to say that most of them are thermophylic (*i.e.*, heat-loving), it would appear that they can so adapt themselves that very appreciable amounts of acid are produced under normal summer conditions in a few months. When testing for contamination of the pack, the incubator results are of the utmost value, since an idea of the extent of the trouble may be gained in sufficient time to save the remainder of the season's pack. The use of incubators in the vegetable cannery may be the means of saving a whole season's output from trouble which may not be evident in the ordinary course of events for many months; and this is true even without the help of a resident bacteriologist, since a practical canner is able to diagnose trouble in this way by careful examination.

REFERENCES.

[1] W. D. Bigelow and A. E. Stevenson, *Natl. Canners' Assn. Bull.*, 20L.
[2] Esty and Stevenson, *Natl. Canners' Assn. Bull.*, 26L.

## *Correspondence on* DRIED MILK

### *From* A. L. BACHARACH, M.A.(Cantab)., F.I.C.

PERMIT me to comment on two matters mentioned by Mr. Harold Silman in his very interesting discussion of "Dried Milk" (FOOD MANUFACTURE, October, 1935). In the first place, Mr. Silman writes that the high temperature of drum drying "will affect the casein and impair the solubility". This statement faces a summary of the paper presented by Howat and Wright to the World Dairy Congress in 1934, in which they analyse with great care the different factors affecting the "insolubility" of milk powders. They also state that "atmospheric roller-dried powders possess a poor solubility", and, later, that "the protein of roller-dried milk powders is insoluble".

I think it should be borne in mind that all these comments are made from the point of view of physical chemistry rather than from that of dietetics, especially infant nutrition. It is, of course, a truism that considerable changes take place in the protein of milk when it is dried, and that these changes appear to be more marked in milk dried by the roller process than in that dried by the spray process, and possibly of a different nature. The practical fact remains that, if a properly made roller process dried milk be carefully reconstituted, there will result a liquid that is, for the purpose of infant nutrition, homogeneous, and remains so sufficiently long to enable any normal infant to be easily fed with it. When this reconstituted milk reaches the infant's stomach, a curd is produced very much more like that of boiled cow's milk than that of raw cow's milk, and in the opinion of many pediatricians this light curd produced by roller process dried milk is one of its outstanding advantages as an infant's food. There is no doubt whatever that the so-called insolubility of roller-dried milk protein, and the light curd produced in the infant's stomach from a roller-dried milk, are different aspects of the same physico-chemical changes taking place in the caseinogen during drying.

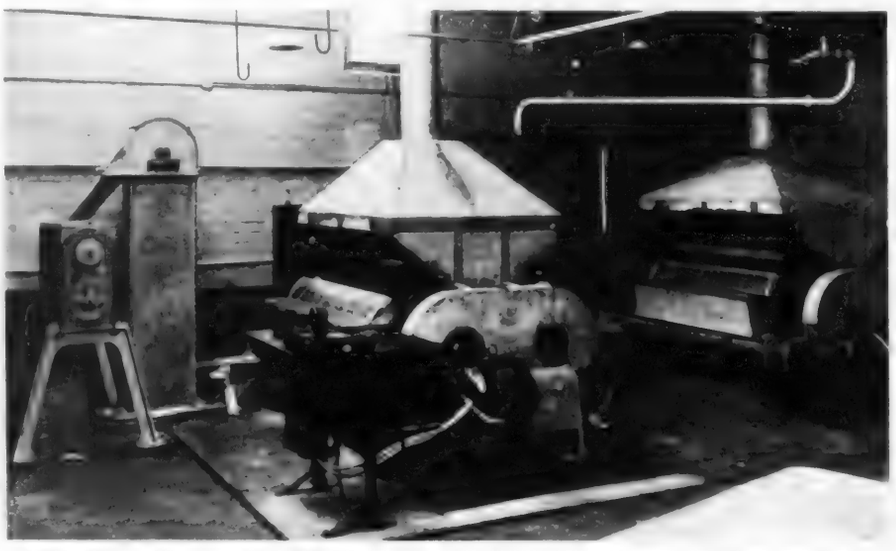
Mr. Silman also remarks that "the antiscorbutic vitamin C is seriously affected by most processes, as it is highly sensitive to heat and oxidation". Permit me to point out that it was demonstrated many years ago by Hart, Steenbock and Ellis (*J. Biol. Chem.*, 1920, **42**, 383), and quite independently by Jephcott and Bacharach (*Biochem. J.*, 1921, **15**, 129), that the destruction of vitamin C during the roller process of drying is negligible. The reason for advocating, as do all reputable manufacturers of roller process dried milk for infant feeding, the regular administration of some source of vitamin C, in addition to the dried milk, is *not*, as is frequently imagined, that the vitamin C of the raw milk has been destroyed during drying. It is simply that all cow's milk, even when fresh and unboiled, is a relatively poor source of vitamin C and may be practically devoid of it. The addition of orange juice or some other antiscorbutic to the diet of all infants, other than the breast-fed infant, is a necessity recognised by all pediatricians, and in this respect roller process dried milk stands on exactly the same footing as raw cow's milk.

A. L. BACHARACH.

## DRIED MILK MACHINES

WE were unable last month to include a full selection from all the photographs we received representing installations of plant for the production of dried milk, so we are reproducing a further picture showing two machines operating in a creamery in Edinburgh.

These are of the twin roll type, each roll being 28 in. in diameter and 60 in. long, coupled to the geared motor drive. The milk is fed directly to the machine without preliminary concentration, and after removal from the roll by steel scraper blade it passes by a closed conveyor to the sifter, from which it emerges ready for bagging or packing as desired.



**Two Drying Machines for Milk in an Edinburgh installation supplied by Bertrams Ltd.**

# NEW ZEALAND FRUIT

By H. TURNER
London Manager of the New Zealand Fruit Export Control Board.

*This paper was presented at the discussion of problems of fruit storage and transport held on August 29 in London during the Imperial Botanical Conference.*

*Loading New Zealand Fruit. With acknowledgments to the New Zealand Fruit Board.*

## Transport and Storage Problems

I SHOULD like to preface my remarks by stating that the problems and difficulties met with in the transport of New Zealand fruit are practically identical with those met with by the fruit industry of Australia, and in our efforts to solve these problems we are working along almost parallel lines.

In this paper it is proposed to deal almost exclusively with apples, and in the space available it will not be possible to give more than a picture in miniature of the magnitude of the problems which have been, and are still being, faced in the attempt to preserve in storage one of the most perishable of our fruit products.

To those not in touch with this particular form of food preservation research work it is difficult to convey an adequate idea of the immense amount of time, thought, and money which has been spent in scientific work on behalf of this industry, but it may be safely claimed that there is no more valuable form of closer land settlement than fruit growing, and no more worthy object on which time and money should be expended. Just what the fruit bill for the United Kingdom represents may be gauged from the fact that the imports alone of raw fruit have risen from the 1909 to 1913 five-year average of 713,000 tons per annum to a total of 1,354,000 tons in 1934. In passing it may be mentioned with satisfaction that whereas in the period 1909 to 1913 the percentage of Empire-grown fruits included in the imports was only 15 per cent., it has risen steadily since then to 45 per cent. in 1934.

### Nature and Varying Characteristics of the Fruit

(*a*) VARIETIES.—Although originally nearly 100 different varieties of apples were on the approved list for New Zealand, this figure has now been reduced to less than 30, partly on account of the unpopularity of some of the varieties with the consumer, and partly owing to the unreliability of others under transport conditions.

(*b*) CHARACTERISTICS.—While each variety discloses its own peculiarity in regard to maturity date and keeping qualities, etc., the same variety may vary considerably in these characteristics in different districts or provinces in New Zealand, and even in the same orchard, according to the nature of the soil, elevation, etc.

(*c*) MATURITY.—The question of maturity is not only a vital one from the viewpoint of life and quality, but it is also a most difficult one to define with any scientific accuracy. Drs. Kidd and West, in their outstanding work, have shown conclusively that maturity is a function of the respirative activity of the apple, and that the fruit should be picked prior to the onset of the climacteric or period of maximum respirative activity. Unfortunately, no simple means of ascertaining the state of respirative activity has yet been discovered for use in the orchard. This is usually gauged from the colour standpoint, although this is not looked upon as completely reliable.

These conditions have an important bearing upon the life length of the fruit after harvesting and its response to storage and transport conditions, so that without enlarging further upon this important aspect some idea will be gained of the problems which face those responsible for the safe carriage of this perishable commodity 12,000 miles by sea, much of the journey in tropical waters.

### Treatment Prior to Shipment

All fruit for export is picked and packed under strict Government regulations and supervision, while every consignment submitted for export is inspected at the

assembly point by Government inspectors, who are themselves experienced orchardists and expert packers. Even after passing this test samples are also examined at the ship's side during actual loading operations into the oversea ships, and any parcel not coming up to standard for grade or condition is turned down.

Generally speaking, therefore, it may be claimed that all reasonable precautions are taken to ensure the delivery of the fruit into the ship's hold in sound condition. In the production and preparation of the fruit for export the grower is guided and helped in every possible direction by the Government Department of Agriculture, even to the extent of issuing a schedule of picking dates for the different varieties in the various districts and provinces.

## Conditions of Transportation

(*a*) SHIPS.—While it must be admitted that in the early days of fruit export many of the ships available were of questionable efficiency for the job, the various shipping lines have been unsparing in their efforts to improve matters by discarding some ships for fruit carriage altogether, improving the conditions in others, and last but not least, by the building of a considerable fleet of fast cargo liners with refrigeration accommodation which is the last word in up-to-date scientific and practical progress.

(*b*) METHODS OF REFRIGERATION.—There are two main methods of refrigerating ships' holds,—namely, (1) that utilising grids within each hold through which refrigerated brine is circulated. In these holds convection currents are depended on to obtain temperature distribution, although in more recent practice fans are used to assist in obtaining more uniform air circulation. (2) The battery system of refrigeration, in which air cooled by passage through coolers placed outside the holds is blown through the hold, the direction of the air stream being reversible.

There are various modifications of these systems in use, but there appears to be a preference for the battery system in various modifications in more recent ships.

(*c*) METHODS OF STACKING AND DUNNAGE.—This is a subject of particular interest and importance in this story of shipboard transport. When stacking fruit cases in a ship's hold the established practice until recently was to separate each case, both vertically and horizontally, with strips of timber of about $\frac{1}{2}$ in. thick, interspersed with larger battens every third to fifth tier. This system is used in both grid and battery holds to facilitate, as is generally understood, the passage of cold air through the apertures or channels provided by the dunnage timber and thus hasten the cooling of the fruit.

This important field of fruit dunnage research has been extensively explored at the Ditton Laboratory of the Food Investigation Board by Dr. A. J. Smith and his colleagues, and it is hoped that the fascinating story of the vast amount of work carried out by them with great success will eventually be published.

Briefly, the results of these explorations may be summarised by describing two main systems of dunnage which are claimed to be suitable for grid holds and for battery holds, and which are under trial as an alternative or substitute for the methods now in general use.

(1) *The Shaft or "Tower" System of Grid Holds.*—It has already been mentioned that in grid holds the required equalisation of temperature distribution throughout the hold and the contained fruit was arrived at by means of the convection currents produced by the cold air gravitating from the overhead grids. It is, of course, a matter of general knowledge that cold air is heavier than warm air and automatically falls to the lower levels as the grids or refrigerated pipes have the desired effect of reducing the temperature. The descending cold current automatically displaces the warmer air, which rises to the grids and is cooled, to be sent again on its journey downward, and so automatically commencing and maintaining a flow of air from the higher to the lower levels and from the lower to the higher. The small channels in the stack obtained by the use of the wooden battens were claimed to provide channels for the efficient circulation of the cold air. At the Ditton Laboratory it was found, in the course of experiments on a commercial scale, that traffic jams frequently occurred in these small channels, due to the resistance of rising streams of warm air. A solution was found by providing a few large

**An apple orchard in Hastings, New Zealand. With acknowledgments to the New Zealand Fruit Board.**

shafts or "towers" equal in square measurement to the size of an apple box in the fruit stack in place of the usual large number of small channels. These air shafts are distributed over the area of the hold, some of the shafts being carried to the full depth of the hold, others two-thirds of the depths, and others again one-third. At the point where these shafts terminate, battens of 3 × 3 timber are laid in horizontal positions so that a channel or lateral passage for air circulation is directed into each shaft or "tower". This method was found to provide adequate space for free air movement, both laterally and vertically.

Several commercial trials have been carried out in fruit cargoes from New Zealand and Australia under this system with complete success, and there is reason to believe that the general principle with modifications suited to the varying conditions will be used to an increasing extent in grid holds in the near future. The method enables economies to be made in space, eliminates the need and cost of much timber dunnage, and generally facilitates loading and unloading.

(2) *The "No-Dunnage" System for Battery Holds.*—The traditional method of stacking with wooden laths or battens is also used in battery cooled holds for the reasons already stated. Smith has been making daring experiments in the model ship's hold at Ditton, eliminating all dunnage and packing the cases in a solid block, the vertical air current being reversed from time to time with about 25 to 30 changes of air per hour. It is, of course, obvious that this system could apply only to battery holds. The results of the experiments were highly successful, it being found that the temperature distribution was the best ever found and that the fruit was cooled more rapidly. The explanation is comparatively simple. It is claimed that by eliminating the channels or air passages usually provided by the batten system the cool air is forced through the cases themselves and the heat more efficiently extracted from the individual apples than is the case when the air current is forced past the fruit through the channels provided by the dunnage system. One experimental shipment of this system has been made from New Zealand this season, the results being comparable with the balance of the same ship's cargo carried under the usual dunnage system. The general condition of the fruit upon discharge was sufficiently encouraging to justify the hope that further experiments will be carried out next season.

(*d*) TEMPERATURE.—Turning now to the vital matter of transport—temperatures—a great deal of research work in this country, New Zealand, and other countries, has been carried out with a view to defining the optimal temperature conditions for apples. The results of this work have clearly shown the following:

(1) That different varieties of apples have different temperature tolerances; for example, it may generally be laid down that Sturmers and Jonathans and Cox's Orange Pippins should be carried and stored at 36° to 38° F., while all other varieties should be carried at lower temperatures.

(2) It has been shown that the temperature tolerances of the same varieties of apples vary markedly in relation to maturity and to differences in physiological characteristics due to climatic and yield variations, etc.

(3) It has been definitely established that the upper and lower limits of temperature for apple transport are between 30° and 38° F. Between these degrees individual varieties require temperature control within narrow limits.

## Gas Tolerance

The apple is a living organism giving off carbon dioxide which, if permitted to accumulate, would eventually result in the suffocation of the apple. It is, then, vitally necessary that ships' holds should be adequately ventilated to prevent the $CO_2$ from rising above about 2 to 3 per cent. at the temperatures indicated above. At one time it was the general belief that, provided a correct range of temperatures was maintained in the ships' holds, it was reasonably certain, given sound fruit to carry, that the cargo would turn out in good condition. It was only after many serious losses that the deadly menace of an over-accumulation of $CO_2$ was established. Immediately the danger of an excessive percentage of $CO_2$ was established the shipping lines were unsparing in their efforts to detect and eliminate the source of the trouble, with the result that damage from this cause is almost non-existent in these days.

The responsibility for maintaining the required tem-

perature and atmospheric conditions rests with the shipping companies from the time the fruit is loaded and until discharge, and it will be realised that the temperature tolerances described above require constant vigilance for accurate maintenance.

The development of refrigerated transport is one of the most fascinating chapters in the history of applied science, and the carriage of mixed cargoes of refrigerated produce in the same ship—*e.g.*, butter and frozen lamb, at 15° F., apples at 36° F., and cheese at, say, 45° F.—presents a nice problem to the engineers, and it is impossible to speak too highly of the efforts of the shipping companies and their engineers to grapple with these problems.

## Wastage

Under this heading brief reference is made to the chief causes of wastage in New Zealand apples, although it is satisfactory to note that, especially in recent years, we have in the aggregate significantly reduced loss from wastage. Our present losses, however, are sufficiently serious to warrant careful research to reduce or eliminate the main causes of loss which are briefly described below.

(*a*) Bitter Pit.—This disease, no doubt well known to all, is probably our most serious single disease, because it occurs in varying degrees in our most valuable export variety—namely, the Cox's Orange Pippin. The cause of the disease is as yet unknown, but we do know that its incidence is higher in comparatively immature or early picked fruit, and that in fruit susceptible to pit its incidence is higher at 37° F. than at 35° F. Accumulated knowledge indicates that pit liability varies from season to season, and that it can be reduced by later picking and transport at the lower temperature range. Several theories, as yet unproved, have been advanced as to the cause of bitter pit, including mineral deficiency, virus and irregularity in moisture supply. It is also observed that in seasons of short crops, tending to larger fruit, the incidence of this disease is increased.

(*b*) Low Temperature Breakdown. — As already stated, apples vary in relation to their temperature tolerances. Some varieties, when held at 34° F. or below, are rapidly affected by flesh collapse, or what is called low temperature breakdown, which renders the fruit commercially valueless. For example, the Cox's Orange Pippin variety does not tolerate low temperatures, and so for this variety a compromise temperature has to be fixed because pit incidence is lower at the low temperature. In general, it may be stated that no apples should be carried below 32° F.

(*c*) Fungal Rot.—It is well known that ripe fruit reaching the end of its life is soon affected by fungi. It will be understood, then, that fungal rotting would occur in over-mature fruit, due to too late picking, or transportation at too high a temperature. On the whole the loss from fungal rotting in New Zealand apples is remarkably low.

(*d*) Bruising.—This is perhaps one of the most serious causes of wastage in our fruit. It is inevitable that a certain amount of bruising will occur when it is visualised what vicissitudes attend the journey of the individual apple from the tree to your table. A great deal of study has been given to the problem of packing the fruit, the design of box, the selection of wrapping material, elimination of rough handling, etc. There is still much to be done, and it is urged that this problem of the elimination of bruising should be tackled co-operatively by empire fruit producers in view of its widespread incidence.

## Research

Reference has already been made to some of our problems, and at this point it seems opportune to give a brief account of the machinery which has been built and the links which have been forged to solve these problems.

(*a*) Local Organisations.—Largely as a result of a grant from the Empire Marketing Board, whose demise we all greatly deplore, a Fruit Research Organisation has been built up in New Zealand, with financial assistance from the Government and the Fruit Board. The whole cost of the organisation is now borne by these two. The scheme is controlled by the D.S.I.R., with the closest association with the Department of Agriculture, the Cawthron Institute, and the Fruit Board. The centralisation of fruit research in the Dominion has facilitated vital co-operation with England. This practical co-operation could not be better illustrated than by the fact that with the pioneer shipment of New Zealand fruit by the "no dunnage" system, carried by the New Zealand Shipping Company's *Rangitane*, came Mr. R. Sutherland, the New Zealand Government Refrigeration Officer. A practical refrigeration engineer with many years' experience of fruit storage, Mr. Sutherland, as an officer of the Department of Agriculture, is in the closest collaboration in New Zealand with the D.S.I.R., the Cawthron Institute, and the Fruit Board, by whose united efforts it was made possible for him to accompany the shipment and make personal contact with the research workers on this side of the world. The result of this visit will be of considerable value in still further strengthening the links of sympathetic and helpful co-operation.

(*b*) Food Investigation Board.—It is particularly gratifying to have the opportunity of paying a tribute to the F.I.B. in general and to the staffs of the Low Temperature Station, Cambridge, and at the Ditton Laboratory in particular. New Zealand, in common with other Empire countries, fully realises the extreme value of the work carried out at these stations on our particular problems. The New Zealand research staffs look to Cambridge for guidance and derive constant stimulation from the constructive help always readily available. The link which has been so firmly established has perhaps been mutually beneficial because we have been able to organise experimental and commercial shipments of fruit to test out on a large scale some of the results established in the laboratory or in the ship's hold at Ditton. I give a few of these examples:

(1) *Temperature Experiments.* — Reference has been made to the necessity for defining the temperature tolerances of apples—*e.g.*, Cox's Orange Pippins. Split consignments of Cox's Orange Pippins of known history have been made over a number of years. The plan has been to retain part of the experimental fruit in cold store in New Zealand and to ship the other part in experi-

mental chambers in two or three selected temperatures. Examinations of the fruit thus shipped and held locally in known temperature conditions are made at the same time in New Zealand and at the Covent Garden Laboratory of the F.I.B. In this way results have emerged which have enabled our colleagues at Cambridge to advise on the optimal temperatures of carriage.

(2) *Dunnage Experiments.*—Similarly shipments of fruit to establish the commercial practicability of using the systems already described have been co-operatively organised. It has been essential to explore the temperature distribution in the selected holds by means of distant reading thermometers and to carry out a wide inspection of the fruit on arrival in London. The resultant data are then carefully considered at Cambridge and reports are rendered to New Zealand.

These two examples will serve to illustrate what is being done co-operatively to solve our problems, to help the producer and to give the consumer the best possible quality of fruit.

Personally, I believe that this is a splendid example of imperial co-operation on common problems which might well serve as a basis for the development of similar work in other directions.

I would like to take this opportunity of recording our appreciation of the services of the late Sir William Hardy, Mr. Barnard, Drs. Kidd, West, and A. J. Smith, Mr. J. Barker, and Mr. Furlong.

*(Reproduced by permission of the New Zealand Fruit Board.)*

**New Zealand Apples Properly Stored.**

## Consultative Group

None of the experimental shipments would have been possible without the close co-operation of the shipping companies, who have during the last few years been represented on the F.I.B. Consultative Group. This group was established as an informal body to bring together Dominion representatives, the shipping companies, and the F.I.B. staff concerned. This close association has proved of immense benefit in co-ordinating effort and in enabling intimate discussion of problems and results. Through this medium the findings of Cambridge and Ditton have been made immediately available to all concerned. Many of the doubts and misunderstandings which previously existed have been dispersed by this personal contact, and I would like to pay a handsome tribute to the ever ready help given by our shipping colleagues in affording facilities and technical control for experimental shipments.

## Liaison

Finally I would like to emphasize the value of personal liaison which provides the key to all our co-operative research work. I believe our English colleagues will agree with me when I say that the New Zealand Government Scientific Liaison Officer, Mr. Nevill L. Wright, has been largely instrumental in the building of the present close association between New Zealand and the F.I.B.

## Future Work

Although a good start has been made on the most urgent problems, a great deal remains to be done. The dynamic nature of research results in the constant output of new ideas, new methods, new processes. We hope to explore the local and shipboard possibilities of gas storage for apples, etc. It may be possible for New Zealand to make available to the British consumer a part of her supplies of stone fruit, such as peaches, apricots, nectarines, etc. It may even be possible to send you supplies of fresh vegetables during your scarcity periods.

The exact temperature conditions have to be defined and the correct state of maturity, etc., found before the multitude of questions which arise can be answered. The foundations of the necessary machinery have been laid, and it now rests with those most vitally interested to provide the further necessary means for attacking the problems, the solution of which should be of immense benefit to both producer and consumer.

## ACKNOWLEDGMENTS

THE photographs appearing in the October issue of FOOD MANUFACTURE, illustrating the article on "Date Products," were supplied by Field and Co. (Fruit Merchants), Ltd., and the graph and Tables I and II of "The Chemistry of Cheese Ripening" were lent to us by the *Journal of Chemical Industry*. We regret that acknowledgment was not made with the articles concerned.

# RONALD SIDNEY MORGAN

## An Appreciation

MANY OF our readers will have heard already of the untimely death in tragic circumstances of R. S. Morgan, whose name is prominently associated with the study and isolation of vitamins. Endowed with abundant energy, ability and enthusiasm, he had already done a great deal of valuable work for one so young. He was only thirty-one, and those who knew him personally realise that whilst he possessed such a zeal for scientific study, he was a man of high ideals, a talented musician, and, moreover, a good friend. His interest in the welfare of others is revealed by the kindly mission he was fulfilling when he met his death. Mrs. Morgan and their two very small children will have the deepest sympathy of everyone in this their greatest loss.

When, in 1926, Morgan joined the staff of the Central Technical Department of Lever Bros., Ltd., as principal assistant to Mr. K. MacLennan, M.C., B.Sc., Head of the Food Research Section, this section was in a position very opportune for development. Methods had been discovered in the department for the manufacture of fat-soluble vitamin concentrates, but there was scope both for the development of the existing methods and the discovery of new ones.

Morgan proved the ideal man for the situation and took a very prominent part with his chief and colleagues in carrying out researches, which led to greatly improved methods for the manufacture of fat-soluble vitamin concentrates. Nationally, the result of this work was of fundamental importance, since it enabled the economic incorporation of fat-soluble vitamins in the whole of the margarines manufactured by Unilever, Ltd., and the production of the well-known vitamin concentrates "Essogen" and "Advita" of Lever Bros., Ltd.

Other related researches which Morgan carried out at this time led to the publication of two papers: "The Fluorescence of some Vitamin A Containing Fats" (Morgan and MacLennan, 1928, *Biochemical Journal*) and "The Interpretation of the Colour Match in the Antimony-trichloride Test for Vitamin A". The former paper placed the fluorescence of fats on a quantitative basis and correlated it with vitamin potency.

Considerable difference existed between the Carr-Price blue values when determined directly on certain oils, and when determined via their unsaponifiable matter. Morgan's second publication described a simple means for obtaining a better correlation between results of these determinations by using the blue-minus-yellow value when the determinations were carried out on the oils.

In 1930, Lever Bros., Ltd., decided to reopen and extend their Animal Nutrition Laboratory, which has since been visited by many eminent scientists, and this became Morgan's particular charge till his death. There he built up a sound and numerous experimental stock and devised the necessary nutritional experiments. The result was that although he was responsible for a large amount of routine work in connection with the vitamin products of Lever Bros., Ltd., he was at the same time continually making important contributions to the knowledge of the subject. This can be seen by a list of the remaining papers he published, while it must be borne in mind that a considerable part of his work was of industrial value and for that reason could not be published.

A Diet without Caseinogen for Use in the Determination of Vitamin A, Morgan (1934), *Biochem J.*, **28,** pp. 1178-1192.

A Discrepancy between Biological Assays and Other Methods of Determining Vitamin A, Morgan, Edisbury, and Morton (1935), *Biochem J.*, **29,** pp. 1645-1660.

The Determination of Vitamin D in the Line Test by Measurement, Morgan (1932), *Biochem J.*, **26,** pp. 1144-1154.

Vitamin Potency and Associated Characteristics of Average Cod Liver Oil, Morgan and Pritchard (1935), *Analyst*, **60,** pp. 355-368.

It is not possible to describe all these publications in the space available, but particular attention should be drawn to the third of these contributions, which contains a description of a much-improved technique for the vitamin D "line test". With the aid of a Zeiss aplanatic magnifier, and Abbe camera lucida, and a planimeter, the actual areas of fresh calcification in the distal ends of the radii and ulnæ were magnified, drawn, and measured. This technique afforded a much more satisfactory quantitative estimation of vitamin D than had hitherto been available, and was of immense value for the control of the manufacture of large quantities of foodstuffs or concentrates, which had to contain a standard amount of vitamin D.

Morgan's eminence in his special field of investigation had become freely recognised, so that he was in frequent touch with academic as well as industrial workers. One of the results of this collaboration was the work published jointly with Dr. R. A. Morton and J. R. Edisbury of Liverpool University.

While the special position of vitamin research may have afforded opportunities to Morgan that do not occur to many industrial research workers, those who knew him and his work realise that there were few who would have exercised these opportunities in such a brilliant style and made such valuable contributions to knowledge of both industrial and academic value.

# INTERNATIONAL COMMISSION FOR THE EXAMINATION OF FATS

We are informed by Viscount Tiverton, B.Sc., the Hon. Secretary of the Reception Committee of the Sixth Reunion of the International Commission for the Examination of Fats, that their meetings were successfully launched on Tuesday, October 1, at the rooms of the Royal Society of Great Britain, with Mr. E. R. Bolton, F.I.C., in the Chair.

The International Commission is not a large one, although it deals with a very important subject, and in view of the disturbed conditions in Great Britain it is gratifying to find that the countries most interested in the subject were well represented. Amongst those present were the following:

| | | |
|---|---|---|
| Professor Vesely | Representing | Czechoslovakia. |
| Professor Margaillan<br>Dr. Vizern<br>Dr. Wolff | ,, | France. |
| Dr. Rietz<br>Professor Täufel | ,, | Germany. |
| Mr. Bolton<br>Mr. Robertshaw<br>Mr. Shepherd | ,, | Great Britain. |
| Dr. Voermann | ,, | Holland. |
| Dr. Sporer | ,, | Italy. |
| Lord Tiverton | British Technical Interpreter. | |

Mr. Bolton, President of the Sixth Reunion, in his address of welcome, spoke on behalf of the Federal Council of Chemistry, the Society of Public Analysts, and also the British Standards Institution. He regretted very much that Professor Rivals, the President, had been unable to come over from Paris, due to his unfortunately being indisposed. He explained that one of the constituents of the Federal Council was the Society of Public Analysts, the only society in this country solely devoted to the question of analysis, and that they published a journal called *The Analyst*, which was the only journal in this country devoted to the science of analytical chemistry.

He then touched on the organisation of the British Standards Institution, and particularly the Chemical Division, and said that one of their duties was to prepare standard methods of analysis in connection with the various specifications they issued. They adopted such methods of analysis as were generally agreed upon in England, and if they were at all dubious as to their accuracy, or any doubt arose as to their acceptability, they consulted the Society of Public Analysts and asked them to investigate the matter.

The delegates, he said, would realise from this that the Government did not prepare any methods of analysis. They adopted whatever was agreed to nationally. Of course, anyone could make a contract and agree on any method of analysis, but that would hardly be wise in view of the national agreements issued by the acknowledged standardising authority.

Touching on the attitude of this country towards this International Commission, the President said he felt sure he was voicing the feelings of everybody in saying that nobody liked being forced to adopt anything, but they would be willing to adopt methods agreed upon internationally, particularly if such methods rendered it easy for goods and samples of goods to be sent from any one country to another and to be analysed by any chemist in accordance with the recommendations of this International Commission: especially if they could be assured that the tests made in different parts of the world were reasonably comparable.

By their meetings here in London they would be continuing their endeavour to minimise the lamentable disagreement among chemists, which everyone deplored, and he felt that in this they would receive very great support in this country. He said that the Commission was a small one, but they were all agreed that its work was of the highest interest to industry, and he hoped that the work on which they were going to embark would be thoroughly successful.

He then called upon Dr. Armstrong, F.R.S., past Chairman of the British Standards Institution, and Chairman of its Chemical Division, to address the delegates.

Dr. Armstrong, on behalf of the British Standards Institution, under whose auspices the meetings were being held, in welcoming the delegates, emphasised the fact that the B.S.I., although it had Government support, had no Government control. He said that it was a purely voluntary organisation, but most successful and supported by the leaders of industry throughout Great Britain. It enjoyed the confidence and to a large measure the financial support of the British Government. It had an elastic constitution and was always able to lend a helping hand as a neutral platform for the discussion of industrial problems of standardisation and the reconciling of conflicting interests. He felt that on the present occasion there was no body more fitted to sponsor this particular reunion than the B.S.I. It had gladly accepted the responsibility with a full understanding of the importance of the Commission's work, and he hoped that their meeting in London would be fruitful and their sojourn pleasant.

A luncheon was held subsequently at the Royal Automobile Club, with Dr. Armstrong in the Chair. The Commission then went into session in the afternoon.

Various excursions of interest to the foreign delegates were arranged, and a dinner was offered to them at the close of the Conference at the Hall of the Salters' Company in the City of London.

**Members of the Reception Committee and Delegates at the luncheon held on October 1, at the Royal Automobile Club in London, on the occasion of the Sixth Meeting of the International Commission for the Examination of Fats, organised by the British Institution of Standards.**

Front Row: *Viscount Tiverton, Sir Frank Smith, Dr. E. F. Armstrong, E. R. Bolton (President), Dr. S. Sporer (Gen. Sec. Italy), Professor Vesely (Czecho-Slovakia), Miss E. Lewkowitsch.* Left to Right (Back Row): *G. Robertshaw, E. R. Vose, J. O. Cooke, E. B. Hughes, Professor Margaillan (France), Dr. Wolff (France), Emil Mond, C. Le Maistre (Director of B.S.I.), Captain D. Van den Bergh, Dr. Vizern (France), A. B. Shepherd, M. C. Lamb, Dr. H. B. Cronshaw (Editor-in-Chief of "Food Manufacture"), Dr. L. H. Lampitt.*

# NEW BOTTLE CAP

CLOSURES FOR glass bottles must essentially be hermetic, and to be of real value in many instances after first opening they should be hermetically re-sealable. Various types of closure have been produced in an endeavour to achieve the ideal cap.

### The Screw Cap

At first, the principal nearest at hand was tried—namely, a tin cap with continuous thread used in connection with a glass container having a corresponding continuous thread on the neck. As packing, a pasteboard disc or cork was used.

To the mechanical engineer it is self-evident why the screw-cap construction cannot be a success as an hermetic closure. The difficulties are not so much found with the screw cap itself as with the impossibility to manufacture in mass production a glass thread of sufficient accuracy. It is evident that the thread in the screw cap must in its entire length closely follow the glass threads on the glass if the flat portion of the cap shall close absolutely parallel with the top surface of the glass when the cap is screwed on. Another difficulty with the screw cap is its tendency to lock itself so hard that it frequently is impossible to open it. The reason for this lies partly in the characteristics of the continuous thread, as the frictional surface in this design is unusually large.

### Hermetic Cap not Re-sealable

Next came the plain cap with a cork or rubber gasket, held and pressed against the closing surface of the container by means of a metal strip, which caught on the top surface of the cap and under a flange on the neck of the glass container. The metal strip is put on by machines specially constructed for the purpose, and the closure is an entirely dependable hermetic closure. But when the metal strip or band is removed and the cap taken off it cannot be replaced to form a seal.

### Screw Cap with Sectional Threads

Caps of this design are also available, and these do eliminate certain disadvantages of the screw cap, such as the necessity for accurate manufacture of the continuous glass thread and the locking of the threads when closed. Such caps are, however, prone to working loose, owing to vibration in transit, for example, the sharp pitch of the thread sections on the glass, and any release of pressure due to elasticity of the paper gusset, permitting movement to take place.

To the consumer the efficient re-sealable closure is undoubtedly an attraction, though the screw cap is, in the case of many foodstuffs and drinks that do not rapidly deteriorate, an adequate closure to keep out dust and flies and to prevent loss due to accidents. Nevertheless, the re-sealable and hermetic closure that is easily operated and will withstand fairly prolonged usage without destruction, and that can be produced economically, is the ideal to which to attain.

There is the type of re-sealing closure which depends upon the grip around the flange of the container effected by a spring type of lid. The centre of the lid is depressed to release the grip of the rim, closure being re-effected by pressure upon the rim causing the lid to take up its original form. Then there is the simple type of cap of which the rim is made to grip or release its grip upon the flange by the pressing or raising of a twisted steel wire around which the rim of the cap is folded. Both of these caps usually have a cork or lacquered pad to achieve close contact.

Now, to the endeavours to devise the ideal type of closure have been added one for which special claims are made—the Duplex Seal, produced by Duplex Seals, Ltd.

This seal also employs the sectional thread principle, but instead of placing the thread sections on the glass they are in the Duplex design part of the cap. These thread-sections on the Duplex cap are, however, not of the same rigid character as the thread in the screw cap, but consist of *flexible* segments made by the bending inwards of the lower edge of the skirt of the cap. The thread-sections have a varying pitch—at the start the pitch is greatest in order to provide for an easy grip of the cap to the glass and then the pitch gradually grows smaller so that at a point it entirely disappears. On the glass containers for Duplex seals are three, four, or six bosses, which have no thread-pitch.

As can be seen in the illustrations, this seal has a gusset of such thickness that the required tension develops when the cap is drawn. The spring pressure exerted by the thread-sections in the Duplex cap when this is drawn on to the glass is calculated as sufficiently great to neutralise even comparatively large variations in the distance of the glass bosses from the sealing surface,

(*Continued on page* 412.)

**The Duplex Seal.**

# INFORMATION and ADVICE

## Meat Canning—Food Enquiries—Horse Radish Cream—Tonic Water—Iron Ration—Diabetic Jams

### Meat Canning

1,944. *We are manufacturers of preserved meats in tins, such as tongues, and we are at present investigating the latest canning methods and machinery.*

*In connection with these investigations we have been in touch with the Low Temperature Research Station at Cambridge, and they have advised us that possibly the Editor of your paper may be able to give us information, or anyhow refer us to articles likely to be of interest which have been published in your journal. The points we are particularly interested in at the moment are:*

(a) *The use of drawn cans, and whether these are safe for the packing of meats, assuming that the tinplate is to be drawn to a depth of 2 in.*

(b) *The use of stove-lacquered tinplate.*

*Our own present packs are the usual type of tin with a lid and bottom which has been soldered on, the lacquer being applied at the end of the process*—i.e., *after the meat has been packed into the tin and cooked.* (London.)

We do not recommend this—*i.e.*, drawn cans—type of container for this particular purpose. It is impossible to avoid stretching of the tin coating on deep-drawn cans without leaving either streaks or pinholes of untinned surface. These uncoated areas give rise to the formation of sulphides when in contact with meat.

If seamless drawn containers are made from lacquered sheets the same objections arise except that with special lacquers and beautifully kept drawing edges on the dies, the extent of exposed iron is reduced. It is our experience that very few lacquers, if any, will stand up to such a deep draw without occasional breakdowns.

Another objection to this type is that the tinplate inevitably puckers in being drawn to that depth, so that the flanges have corresponding wrinkles. These are usually ironed out in the double seamers, but there is a considerable risk of cracks in the metal and almost invariably there are streaks of untinned or uncoated areas. It is not a practical proposition to varnish the inside surfaces after drawing, though on a laboratory scale this is sometimes done. Aside from other considerations, sulphur-resisting varnishes must be stoved, and it is not feasible to get an even coat on the inside of the container. Great difficulties would also arise in the design of a suitable stoving oven to cope with a lot of tins.

There are three methods in general use for packing tongues in tins, the earliest is this: Close the cans cold and then preheat them in a retort. Remove the cans from the retort and then puncture and allow the entrapped aid to vent. Solder up the punctured hole and put the can through the regular process. In some instances, particularly with large cans, they repeat the venting operation in order to ensure high vacuum.

A more modern process is to seal the can with a lid that has a vent hole, place the can in a vacuum chamber and when a high vacuum has been drawn, tip the can with a drop of solder. The can is then processed in the usual manner.

The latest method of all is to seal the can with a vacuum seamer and process. This method is being more and more adopted and is the only method used by Libby, McNeill and Libby, who even vacuum double seam their rectangular corned beef cans.

Processing is usually carried out in tins on which the ends are compounded, and the compound in use is Gold Seal No. 25 Grey.

*Varnishing.*—If the enquirer is referring to stoving varnishes on the finished pack—*i.e.*, on the outside of the tin—to replace dip varnish, we are all against such practice. Dipping is usually done in spirit varnishes, and any cracks in the tinplate or leaks, and sometimes where the tinplate is bruised, the vacuum which is created by dipping hot cans into a tank of spirit varnish leads to drawing inside the tin of some of the fumes or sulphides and ruining the contents.

If the varnished cans are to be coated with a stoving varnish the temperature of stoving will, by over-cooking the contents, affect the pack. Stoving varnishes are rarely tough enough if stoved for less than three and a half hours at 150° F., while most commercial gold lacquers or varnishes require something like 385° F. for seventeen to twenty minutes.

### Food Enquiries

1,945. *Although a subscriber of only short duration and having gleaned a lot of useful advice and guidance from delving in a recent purchase of back numbers, there are three specific items on which your advice would be appreciated:*

(1) *A reliable formula for a salad cream of excellent keeping qualities.*

(2) *The preparation of salted almonds.*

(3) *Formulæ and working instructions for the repacking of Spanish olives from bulk into jars and fancy bottles.*

*I apologise for being in need of so much valued assistance!* (London.)

It is certainly a rather lengthy enquiry to deal with in the limited time and space at our disposal. We have room for publication of only about a quarter of the enquiries we receive, and as for time—well, we have to put some limit on this and hence generally deal with only one question at a time. Once we had a list of thirty questions from West Africa with the urgent request to "rush" the replies through! We certainly rushed a reply—but it was not to the thirty questions. Frequently we get a list of half a dozen questions—but this we think is too much for

an editor to deal with at a sitting, when there are dozens of enquiries from other subscribers to be dealt with. However, as our London enquirer (1,943) wrote such flattering remarks about our efforts, we sent him what he wanted —at least, some help in that direction, as formulæ are one thing and technique through experience quite another.

**Horse Radish Cream**

1,946. *Recently you kindly helped us regarding our Horse Radish Cream recipe, and we regret to report we find this very unsatisfactory. The colour is bad and there is a fermentation. We wondered if the homogenised cream we are using could be anything to do with this, and we shall be glad of your remarks.* (England.)

Without knowing what you have done it is difficult to guess where you have gone wrong. A sample would afford a clue. This illustrates the risk of supplying bare recipes. These may work in experienced hands, but not in the hands of a tyro. It is like blaming a car and not the inexperience of the driver. We can only make rather wild guesses.

It may be that you are using ordinary cream, in which case, of course, one must expect fermentation to take place. The same difficulty would not occur by using unsweetened condensed milk. Another point is that too much salt must not be used. As regards the colour, the horse radish must be kept away from iron, otherwise discoloration will take place. A stainless steel knife should be used for cutting purposes.

However, it is almost impossible to get down to the source of your trouble unless you send a copy of your recipe and the method which you actually use. It would also help if you sent a sample.

By the way, the horse radish must be well washed and the skin removed, after which it should be wiped with a clean cloth.

**Tonic Water**

1,947. *Could you give us either the recipe for, or the composition of, a tonic water of the Schweppes type?* (England.)

We cannot, of course, give proprietary formulæ, even if we had them. Possibly the following suggestion might provide a basis for such a preparation:

| | | |
|---|---|---|
| Quinine bisulphate | .. .. | 8 gr. |
| Aerated lemonade | .. .. | 4 pints |
| Aerated water .. | .. .. | 4 ,, |

This, however, is only a suggestion, and may be not what you want. The best plan is to have a sample matched by a consulting food technologist.

**Iron Ration**

1,948. *We understand the "iron ration" of the British Army has now been superseded by a combination of milk powder and cocoa. We should be very interested to receive any information you can obtain for us regarding this new ration, and, if possible, a complete sample of it as given to the soldier.*

*We also understand that decreamed milk powder is used in the feeding of racehorses. Any information you can give us in this respect will also be appreciated.* (Chile.)

One of our friends writes to us as follows:

"I was informed some time ago that the Army were experimenting with a new iron ration which I understand consisted of cocoa, meat, and biscuits.

They have succeeded with their experiments and the Army has been put on the new ration. I have not seen a sample of this so cannot give you any information regarding it.

With regard to decreamed milk powder for racehorses, presumably separated milk powder is meant. I understand this is given to horses in the form of a drink, approximately half-pound of the separated powder being reconstituted and issued."

On the same question here is another expression of opinion:

"To the best of my knowledge and belief the story about the British Army having been put on to baby food is only an expression of a subconscious desire on the part of the Chileans, who presumably want to send their country over to conquer England. Anyhow, I have not heard anything about it.

Decreamed milk powder is presumably Anglo-Chilean for skim milk powder or separated milk powder, and I have no doubt that it has been used in the feeding of racehorses, as, indeed, of very many other domesticated quadrupeds and bipeds. This is, however, a question that should be directed to a veterinarian or to a horse breeder."

**Diabetic Jams**

1,949. *In Volume X, No. 1, page 37, of* FOOD MANUFACTURE, *mention is made of diabetic jams in which glycerin is used to replace sugar.*

*Could you inform us what proportion of glycerin is used per pound of sugar displaced?* (Australia.)

With reference to your enquiry regarding sugarless jams, we can say without hesitation that the use of glycerin is not advisable.

There is considerable evidence that glycerol follows the normal path of carbohydrate metabolism in the body, and, therefore, the use of this material in any foodstuff intended for diabetics should not be permissible. There is nothing that can be used for sweetening diabetic foods other than products of the saccharine type.

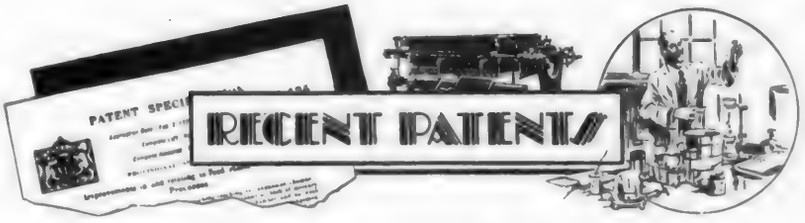
## NEW BOTTLE CAP

(Continued from page 410.)

which variations must be allowed in order to make quantity production possible. The spring tension in the Duplex cap segments causes the cap always to be drawn tightly against the sealing surface at three or more points. The material of the gusset or liner used with this seal will depend upon the nature of the product, and may be composition board, with or without wax, rubber, and so on.

The Duplex Seal, it is claimed, cannot lock itself like the screw cap, it cannot shake loose, and cannot "slide by" its end-points.

The design is patented, and can be produced in tin and plastic materials. It is applicable to bottles and jars used in confectionery, for containers for pickles, sauces, extracts, jams, etc.




*These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

### Latest Patent Applications

24275. GRIFFITH LABORATORIES, INC.: Meat-curing salt. August 30. (United States, November 7, 1934.)

24664. GRENIER, R.: Packing devices for transportation, etc., of ice-cream. September 4. (France, September 5, 1934.)

24984. CAMWHEAT PIE MACHINE CO., LTD., and PRATT, J.: Apparatus for depositing fillings into tarts, etc. September 7.

25013. COX, C. E.: Moulding pastry, etc., substances. September 9.

25116. ROBERTS, T. E.: Moulds for sweetmeats, etc. September 10.

25126. SMITH, C. A.: Crystalliser for sugar massecuites. September 10.

25138. BRITISH ARKADY CO., LTD., and CALLOW, R. H.: Manufacture of bread. September 10.

25251. CALLOW BROS., LTD.: Making bread. September 11.

25453. AMMANN, P.: Process for obtaining alimentary flour from earth-nuts, etc. September 13. (France, September 14, 1934.)

25802. ANCIENS ÉTABLISSEMENTS A. SAVY, JEANJEAN, ET CIE, and BAKER PERKINS, LTD.: Detaching biscuits from wire band conveyors. September 17.

26035. BUSH, S.: Reduction of grain into bread, etc. September 20.

26080. BARRON AND SON, LTD., W. S., and ROWLES, A. H.: Drying cereals, etc. September 20.

26095. ANDERSON, A.: Apparatus for treating cream. September 20.

26269. KOLLÉN, W. J. M.: Packings for eggs, etc. September 23.

26457. NATIONAL SUGAR REFINING CO.: Fabricated sugar products. September 24. (United States, July 25.)

26481. BURTON, J. F. H.: Manufacture of black tea. September 24.

26729. GREEN, R.: Device for making butter in pats. September 27.

26733. KERNOT, J. C.: Treatment of meat waste, etc. September 27.

26779. IMPERIAL CHEMICAL INDUSTRIES, LTD., GLASS, J. V. S., and HIRSH, B. W.: Manufacture of gelatine. September 27.

26807. GENTELE, J. G. W.: Apparatus for drying substances *in vacuo*. September 27.

26808. GENTELE, J. G. W.: Apparatus for drying substances *in vacuo*. September 27. (Cognate with 26807.)

26835. NUTBROWN, T. M., and FRENCH, A. W.: Apparatus for emulsification. September 28.

27004. FIRMENICH ET CIE.: Preparing higher lactones. September 30.

27118. NATIONAL TECHNICAL LABORATORIES: Apparatus for testing acidity. October 1.

27214. ASPINALL, SIR A. E., and HARDY, F.: Treatment of sugar cane juices, etc. October 2.

### Complete Specifications Accepted

434,137. HINRICHS, W. J. H.: Preservation of fruit.

434,249. DINICH, K.: Process for making bakers' yeast from brewers' yeast.

434,324. ZWICK, F. (trading as Schachtel-Käsefabrik F. Swick): Process for preserving rindless cheese. (Cognate application 1529/35.)

434,578. VERPACKUNGS-AUTOMATEN GES.: Method and apparatus for wrapping articles with viscose skin or the like. (Cognate application 32575/34.)

434,682. NAAMLOOZE VENNOOTSCHAP INTERNATIONALE ALFOL-MAATSCHAPPIJ. Container for transporting solid carbon dioxide or solid carbon dioxide and edible ices. (January 12, 1934.)

434,692. WILSON, W.: Apparatus for delivering measured quantities of tea and the like.

434,734. NORDBY, E.: Rolling out of dough-like masses into continuous sheets.

434,740. BLANCHARD, W. J.: Crystallisers applicable for sugar crystallisation.

434,750. DIERBACK, R.: Process of disintegrating cocoa by means of lime.

435,002. JEPHCOTT, H.: Cereal food products.

435,033. SPEAS MANUFACTURING CO.: Preparations for making food products containing pectin.

435,034. ALLGAUER ALPENMILCH AKT.-GES.: Production of a sugar preparation from starch. (Cognate application 7321/34.)

435,166. HARBER, L. S., POINTON, J. E., and BAKER PERKINS, LTD.: Dough dividers. (March 9, 1934.) (Divided out of 7590/34.)

435,225. BERROW FRUIT, LTD., LESTER, P. W. J., and MCCONNELL, F. W.: Apparatus for grading articles by size.

435,242. MÖLLER, G.: Method of preserving egg-yolks, egg-whites, or both.

435,258. ROYAL BAKING POWDER CO.: Method of preparing a food product.

435,272. ROYAL BAKING POWDER CO.: Flavouring material and method of preparing same.

435,344. PASCALL, F.: Sifting or bolting machines for flour and other granular or pulverulent material.

435,373. VICKERS, H.: Manufacture of meat rolls. (Addition to 341,760.)

435,587. RASMUSSEN, A. GERNER-: Preservation of fruits. (October 17, 1933.)

435,613. RASMUSSEN, A. GERNER-: Preservation of fruits. (September 28, 1934.) (Addition to 435,587.) (Divided out of 435,587.)

*Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.*

### Abstracts of Recent Specifications

*Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.*

430,082. GROUP XIII. **Freezing foods.** FLEMING, F. A., 4, Mill Road, Cleethorpes, Lincolnshire.

Fish or other foods in packets of tinplate, cardboard, paper, etc., or in temporary metal containers 44 are passed through tubular conduits 12 of a shape to fit closely against the larger faces of the packets, surrounded by evaporating refrigerant or cooled brine in an outer vessel 10, which is supported by and insulated from an outer casing 29, 30. The ends of the conduits 12 are welded to end walls 11 welded to the wall of the vessel 10, which is supported from the outer casing by bolts 31. Inlet and outlet conduits 32, 33 for the packets register with but are spaced from the open ends of the conduits 12, and are preferably closed by individual drop doors 34, which may be lined with felt. The conduits 12 are shown as rectangular and may be divided

FIG. 1.

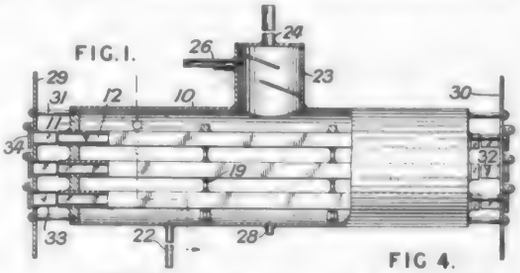



FIG. 3.

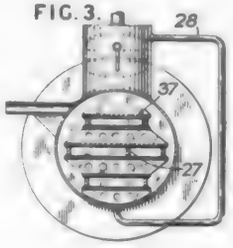



FIG 4.

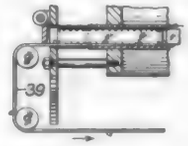
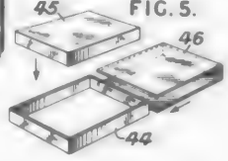



FIG. 5.

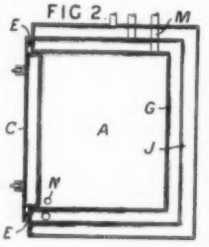


by a longtitudinal partitition 27 (Fig. 3) to accommodate different sizes of packets or groups of packets. They are spaced and supported in the vessel 11 by perforated transverse members 19. Liquid refrigerant—*e.g.*, ammonia—is admitted to the vessel 11 through a pipe 22, and the level is maintained above that of conduits 12 by a float valve, the upper part of the float chamber being connected to a passage 26 leading into a separator 23 above the vessel 11, vapour being drawn off at 24. A gauge pipe 28 (Fig. 3) may be employed to indicate the level by the frost line thereon. To ensure good contact of the packages, flexible stainless steel liners 37 (Fig. 3) may be placed on the main surfaces of the conduits. The fish, etc., may be wrapped in paper and the packets 45 (Fig. 5) compressed and inserted singly or in groups in a metal border frame 44 over which a **U**-shaped cover 46 is placed. In the arrangement shown in Fig. 4 a belt conveyor 39 is used and the packets are passed continuously through the freezer. In the first arrangement they may remain some time in the conduits and be ejected by a pusher or by a further charge of packets. The apparatus may also be used for thawing frozen goods by circulation of a warm medium around the conduits.

430,123. GROUP XIII. **Refrigerators.** XTRAVAC, LTD., 27, Shortland Street, Auckland, New Zealand.

A storage chamber for food and other goods is provided with a jacket G through which cooling or heating media can be passed and a jacket J which can be evacuated, and the storage space A is provided with a pipe connection M for evacuating it and a connector N for breaking the vacuum when the door C is to be opened. The door may contain insulating material or be provided with an evacuated space in order to complete the heat insulation of the storage space. Packing E is provided to prevent air leaking into chamber A when the door is shut.

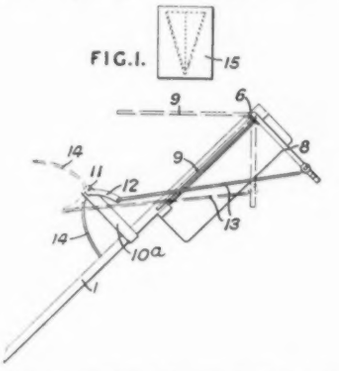
FIG 2




430,220. GROUP V. **Delivery biscuits from moulding machines.** BRITISH HAVACONE CO., LTD., 10, Finsbury Circus, London, and MARSHALL, E. L., Elmside, Garratts Lane, Banstead, Surrey.

A device for delivering biscuits of conical or similar shape from a moulding machine to a trimmer comprises an inclined shoot, means disposed at the upper end thereof to support the biscuits when they leave the mould and convey them to the shoot, and means situated at an intermediate position along the length of the shoot and adapted to arrest the movement of the biscuits during a regulated time interval from the instant of release from the mould. As shown, the shoot comprises three parallel concave guiding members 1, and is provided at a point intermediate its length with a series of rods 14, two of which extend into each of the members 1. The rods 14 are carried by a shaft 11 mounted on uprights 10a on the sides of the shoot. The shaft 11 is provided with an arm 12 connected by a link 13 to an operating arm 8 on a shaft 6 carrying four rods 9 normally adapted to lie one on each side of each member 1. The free end of the arm 8 is connected to controlling mechanism which is also operative to effect the opening and closing of the mould

FIG.1.




15, the connection being such that, when the mould is opened, the rods 9 occupy a horizontal position to receive the falling biscuits, and the rods 14 are also in the raised position. The rods 9 are then lowered to deposit the biscuits in the members 1, the rods 14 being lowered simultaneously to prevent the passage of the biscuits until the mould is next opened. More than one spindle 11 and set of rods 14 may be provided.

# NEW COMPANIES

**Burton's Gold Medal Biscuits, Limited.** To carry on the bus. of bakers, etc. Nom. Cap.: £20,000. Permt. dirs.: G. F. Burton, Doveridge, Preston New Road, Blackpool; W. S. Ashton, Leamington Road, Blackpool; W. A. Argall, Bodinnick, Penzance, Cornwall.

**Clark's Creamed Barley, Limited.** To acquire from George Clark and Son, Ltd., plant, machinery, stock, lease and goodwill, and to carry on the bus. of mnfrs. of food products from cereals, etc. Nom. Cap.: £1,000. Dirs.: H. N. Clark, 11, Hyde Park Gate, S.W. 7; G. B. Clark, 11, Hyde Park Gate, S.W. 7; P. G. Clark, 183, Oakwood Court, Kensington, W. 14; F. T. Poulton, 148, Tubbs Hill, Sevenoaks.

**Cobham Farms Produce Company, Limited.** 28, Mutley Plain, Plymouth. To take over the bus. of breeding and selling pigs cd. on at Libbear Bardon, Shebbear, Beaworthy, Devon. Nom. Cap.: £2,000. Dirs: A. D. Rollo, Libbear Barton, Shebbear, Beaworthy, Devon; R. M. Cresswell, 22, Carlisle Terrace, Plymouth.

**C. Stones and Sons, Limited.** To take over the bus. of potato growers and brokers, etc., cd. on as "C. Stones and Sons". Nom. Cap.: £20,000. Dirs.: J. T. Stones, 19, Grand Avenue, Hove (permt. gov. dir.); T. C. Stones, address not stated.

**Ellis's Pies, Limited.** To take over the bus. cd. on at 19, Croft Street, Gorton, Manchester, as "Ellis's Pies". Nom. Cap.: £20,000. Permt. dirs.: G. Aukland, 293, Wellington Road North, Heaton Chapel, Stockport; Ethel Aukland, same address.

**Finney Bros., Limited.** Milne Holme Poultry Farm, Halifax Road, Todmorden. To carry on the bus. of breeders of and dlrs. in game, poultry, and livestock, etc. Nom. Cap.: £2,000. Dirs.: J. L. Finney, 2, Horsfall Villas, Halifax Road, Todmorden; F. S. Finney, 165, Hollins Road, Walsden; W. L. Lumb, 13, Market Street, Hebden Bridge.

**F. Thomasson and Sons (A-U-L), Limited.** To take over the bus. of a fruiterer and potato mcht., etc., cd. on at 38, Old Street, Ashton-under-Lyne, as "F. Thomasson and Son". Nom. Cap.: £1,000. Dirs.: F. Thomasson, 38, Old Street, Ashton-under-Lyne (permt. mng. dir.); W. N. Thomasson, 51, Mossley Road, Ashton-under-Lyne; E. Thomasson, 38, Old Street, Ashton-under-Lyne. Qual. of dirs.: 10 shares.

**Garden Products, Limited.** To take over the bus. of a fruit, vegetable, and mushroom grower and producer cd. on by L. H. de Courcy Woodward at Bournstream, Billbrook, Somerset. Nom. Cap.: £3,000. Permt. dirs.: L. H. de Courcy Woodward, Bournstream, Billbrook, Washford, Somerset (permt. mng. dir.); G. P. Woodward, Dell Cottage, Littlewick Green, Maidenhead; E. M. Woodward, address not stated.

**Lichfield Confectionery Company, Limited.** 2, Queen Street, Lichfield. To carry on the bus. of dlrs. in confectionery, etc. Nom. Cap.: £2,000. Dir.: Miss M. D. Hales, Wyverncote, Wyvern Road, Sutton Coldfield.

**Lillywhite Dairies, Limited.** To carry on bus. as milk contractors, etc. Nom. Cap.: £1,000. Dirs.: To be appointed by the company or subscribers.

**Pearce's Stores, Limited.** Peek House, 20, Eastcheap, E.C. To carry on the bus. of grocers, provision mchts., etc. Nom. Cap.: £1,000. Permt. dirs.: G. E. Pearce, Oakleigh, Oakford Drive, Barnehurst; Mrs. P. Peace, Oakleigh, Oakford Drive, Barnehurst.

**Phillips of Trowbridge, Limited.** To take over the bus. of a mnfg. and wholesale confectioner cd. on by H. V. Davies at 62a, Ashton Street, Trowbridge. Nom. Cap.: £2,500. Dirs.: H. V. Davies, 34, Clarendon Avenue, Trowbridge, Wilts; Rosa Davies, 34, Clarendon Avenue, Trowbridge, Wilts; J. C. H. H. Oates, 5, Cornfield Road, Northfield, Birmingham.

*The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.*

# RECENT TRADE MARKS

*This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

**APERO.** — 560,983. **Cherries, herrings, sardines, olives, soya bean oil, olive oil, cotton seed oil, ground nut oil, capers, and gherkins, all for food.** JOHN HOUVER, LTD., 153, Whitfield Street, London, W. 1. October 9.

APERO

**B.F.M. 000.** — B 560,911. **Flour.** MARK MAYHEW, LTD., Battersea Flour Mills, 112, Church Road, Battersea, London, S.W. 11, and Britannia Mills, Church Road, Portslade-by-Sea, Sussex. September 25.

MARK MAYHEW, LTD.
B.F.M. 000
LONDON and PORTSLADE.

User claimed from December 30, 1905.

The applicants undertake that this mark when registered, and the marks Nos. B 478,687 (2567), B 478,688 (2567), and B 536,533 (2859), shall be assigned or transmitted only as a whole and not separately.

**BRIGHT CHEER.** — 561,950. **Canned fruits and canned vegetables.** THOMAS H. SNUGGS AND CO., LTD., 17, Philpot Lane, Eastcheap, London, E.C. 3. October 2.

**COCKTAIL VARIETIES.**—561,935. **Biscuits.** PEEK FREAN AND CO., LTD., 158, Drummond Road, London, S.E. 16. September 18. (Associated.)

Peek Frean's Cocktail Varieties

Registration of this trade mark shall give no right to the exclusive use of the device of a cocktail glass or of the words "Cocktail Varieties".

**COLUMBINA.**—560,460. **Substances used as food or as ingredients in food.** GEORGE GILLES, trading as G. Gilles, Avenida de Elche 16, Alicante (Spain). October 2. (Associated.)

COLUMBINA

**DASICUP BRAND.** — 560,669. **Butter.**

DASICUP BRAND
PURE BUTTER

DOBSON'S DAIRIES, LTD., Lloyd Road, Levershulme, Manchester. September 25.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the devices of cows and a pastoral scene.

**D.D. DELICACIES.**—561,025. **Substances used as food or as ingredients in food, but not including tea, sugar, sauce, or pickles, and not including any goods of a like kind to any of these excluded goods.** DOMINION DAIRY COMPANY, LTD., Bicester Road, Aylesbury, Buckinghamshire. October 2. (Associated.)

DOMINION DAIRY CO. LTD. "FRESH AS A DAISY" D.D DELICACIES AYLESBURY BUCKS

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the words "Fresh as a Daisy" and the letters "D.D."

**DEWSWEET.**—561,661. **Tinned, canned, and bottled fruits and vegetables and jams.** KYABRAM CO-OPERATIVE FRUIT PRESERVING COMPANY, LTD., 396, Flinders Lane, Melbourne, Commonwealth of Australia. October 2.

**ELAIS.**—560,652. **Olive oil for use as food.** SOCIÉTÉ ANONYME D'ENTREPRISES OLEICOLES "ELAIS", corner of National Road and Karaiskaki Street, New Phaleron, Greece. October 2.

The transliteration of the Greek characters appearing on the mark is as follows:

"Elaiodom," meaning "Olive oil".

"Agnon Eggyémenon," meaning "Guaranteed pure".

"Elaïs," meaning "Elaïs".

"A. E. Elaiouyrgikônepoih Eirêsêon," meaning "S.A. d'Entreprises Oleicoles".

"Elais," meaning "Elais".

"Neon Faléron-Ellas," meaning "New Phaleron-Greece".

**GOAT BRAND.** — 559,696. **Condensed skimmed cows' milk.** CLEEVES' LTD., Cleevedale Park, 44, South Side, Clapham Common, London, S.W. 4. September 25. (By Consent.)

GOAT BRAND
SWEETENED CONDENSED
MACHINE SKIMMED COWS MILK

**GOLDEN CLOUD.**—558,565. **Milk powder (for food).** DRIED MILK PRODUCTS, LTD., Dominion Buildings, 2, South Place, London, E.C. 2. September 25. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the letters "D.M.P.", the device of a cow, and the device of a cup of ice-cream.

**HEINZ.**—561,920. **Cooked beans, gravy browning, calves'-feet jelly, capers, celery salt (for food), chutney, curry powder, tinned brisling, preserved ginger, dried herbs, horseradish, ketchup, lemon curd, macaroni, mayonnaise, mincemeat, mustard (for food), olive oil (for food), olives, pepper, pickles, salad cream, sauces, soups, spaghetti, tomato juice, pastes consisting of or containing meat, fish, or vegetables; coffee and table jellies.** H. J. HEINZ COMPANY, LTD., Waxlow Road, Harlesden, London, N.W. 10. October 9. (Associated.)

HEINZ ESTD 1869

**KING OSCAR BRAND BRISLING.**—544,726. **Brisling.** CHR. BJELLAND AND CO. AKTIESELSKAP, Skansegaten, 1, Stavanger, Norway. September 4. (Associated.)

By Special Permission
KING OSCAR BRAND
BRISLING
IN PUREST OLIVE OIL

The applicants undertake to use the mark only on brisling canned in Norway.

**LA EUSKARA.** — 560,401. **Butter.** SOCIEDAD ANONIMA LA EUSKARA PRODUCTOS DE LECHERIA, Caseros 696, Buenos Aires, Argentine Republic. October 2.

La Euskara

Registration of this trade mark shall give no right to the exclusive use of the words "La Euskara".

**LUSTY'S.**—558,514. **Roast turkey, roast turkey and ham, boar's head, brawn, tongue, beef and tongue, veal and ham, chicken and ham, chicken and ham and tongue, chicken in aspic, pressed beef, soups and preparations for making soups, turtle extract, turtle meat, meat and fish pastes, lozenges containing beef extract,**

**and beef and vegetable extract, all in tins, glasses, or other containers.** JOHN LUSTY, LTD., 8 to 12, Parnham Street, London, E. 14. August 21. (Associated.)

Advertised before acceptance, the applicants alleging distinctiveness.

**MACGREGOR.** — B 546,212. **Kippers, bloaters, finnan haddocks, smoked fillet, fresh cod fillet, tinned fish, and tinned fish pastes, all for export to and sale in the Union of South Africa, Australia, Canada, and the United States of America.** MACGREGOR FISHERIES, LTD., 6, Southwall Road, Nottingham. October 2.

MACGREGOR

User claimed from January 1, 1928.

**MAGDA.**—558,072. **Sardines in oil.** The firm trading as ABECASSIS, IRMAOS AND CO., Largo do Municipio, 32, Lisbon, Portugal. August 28.

561,236. **Canned fish.** MITSUI BUSSAN KABUSHIKI KAISHA, trading also as Mitsui and Co., Ltd., 1-2, Chome, Muromachi, Nihonbashi-Ku, Tokio, Japan, and Royal Mail House, Leadenhall Street, London, E.C. 3. September 11.

**MILLER'S.** — 561,496. **Baking powder, lemon cheese, bun flour, self-raising flour, cake flour, custard powders, cornflour, and malt.** JAMES MILLER (FOOD PRODUCTS), LTD., Park Place, Cheetham, Manchester, 3. September 25.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the word "Miller's" and the letter "M".

**OCEAN'S BREATH.**—561,192. **Substances used as food or as ingredients in food.** RAYBOULD, WHITEHOUSE AND CO., LTD., Reform Works, Wellington Road, Dudley, Worcestershire. August 21. (Associated.)

**ODILE BRAND.**—560,243. **All goods in Class 42, which includes substances used as food or as ingredients in food.** CINI BROS. AND CO., LTD., 211, St. George Street, Stepney, London, E. 1. August 21. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the letter "C".

**PANDA.**—561,283. **Fresh grapefruit and fresh oranges.** PERKIN AND ADAMSON, LTD., Ulster House, Town Quay, Southampton. October 2. (By Consent.)

**PASHLADE.** — 562,254. **Marmalade.** PASHON PRODUCTS, LTD., 7, Fairley Road, Trading Estate, Slough, Buckinghamshire. September 4.

**PENELOPE.** — 561,842. **Canned fish, canned meats, canned fruits, canned vegetables, and dried fruits.** HENRY W. PEABODY AND CO., OF LONDON, LTD., 16, Eastcheap, London, E.C. 3. August 21.

**PRIF.** — 562,415. **Lard compounds for food, shortenings (being edible fats), and cooking fats.** WESTERN MARGARINE, LTD., Alliance Factory, Western Avenue, Acton, London, W. 3. September 25. (Associated.)

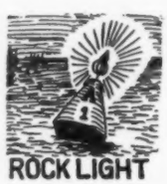
**PROCEA.**—561,482. **Bread, flour, biscuits, rusks, and cereal food.** PROCERA PRODUCTS, LTD., Copthall House, Copthall Avenue, London, E.C. 2. September 4. (Associated.)

**PROCEA.**—561,483. **Bread, biscuits, rusks, and cereal foods.** PROCEA PRODUCTS, LTD., Copthall House, Copthall Avenue, London, E.C. 2. September 4. (Associated.)

**RAMPART.**—561,058. **Substances used as food or as ingredients in food, but not including yeast, and not including any goods of a like kind to yeast.** SCOTT-LYON, LTD., 145, Ferry Road, Leith, Edinburgh. August 21.

**RED ADMIRAL.** — 561,718. **Substances used as food or as ingredients in food, but not including margarine or wheat flour, and not including any goods of a like kind to any of these excluded goods.** HENRY V. PEABODY AND CO. OF LONDON, LTD., 16, Eastcheap, London, E.C. 3. October 2. (Associated.) (By Consent.)

**ROCK LIGHT.** — 561,012. **Tinned fish.** PEEK BROS. AND WINCH, LTD., 20, Eastcheap, London, E.C. 3. September 4.




Registration of this trade mark shall give no right to the exclusive use of the letter and numeral "A1".

Registration No. 153,874 (680) will be cancelled if and before the applicants' mark is registered.

**SATISFAX.** — 562,225. **Sausage meal.** WALTER PRESTON, LTD., Sydenham Works, Sydenham Street, Holbeck, Leeds, 11. September 11.

**SILVER ARCH.** — 562,421. **Lard compounds for food, shortenings (being edible fats), and cooking fats.** WESTERN MARGARINE, LTD., Alliance Factory, Western Avenue, Acton, London, W. 3. October 2. (Associated.)

**SILVERDOWN.**—560,394. **Milk, milk powder (for food), butter, cream, and eggs.** THE SCOTTISH MILK MARKETING BOARD (constituted under the Scottish Milk Marketing Scheme [Approval] Order, 1933), 95, Bothwell Street, Glasgow. August 28.

**SILVER STREAM.**—557,444. **Lard and lard compounds, all for food.** GRANOX, LTD., West Bank, Widnes, Lancashire. September 25. (By Consent.)

**"SPHINX" JAFFA ORANGES.** —

558,982. **Fresh Jaffa oranges and fresh Jaffa grapefruit.** ZADOC ABRAHAM CHELOUCHE, 3, Zariffeh Street, Jaffa, Palestine. August 21.

User claimed from January, 1928. Section 21.

In use upon grapefruit, the mark will be varied by the substitution of the word "Grapefruit" for the word "Oranges".

**ST. JULIEN.**—561,738. **Substances used for food or as ingredients in food, but not including confectionery, cocoa, chocolate, fats, oils, beverages, syrups, or cordials, and not including any goods of a like kind to any of these excluded goods.** LE CHEVALIER, LTD., 37, Eastcheap, London, E.C. 3. October 2.

Registration of this trade mark shall give no right to the exclusive use of the words "St. Julien".

**SUNFLOWER.**—559,020. **Cheese.** KRAFT CHEESE COMPANY, LTD., Silverdale Road, Hayes, Middlesex. October 2. (Associated.)

**SUNKIS.** — 562,095. **Coffee and cocoa.** THE IDEAL TEA CO., LTD., 170 to 180, Howard Street, Glasgow, C. 1. September 11. (Associated.)

**SUNNY FARM.**—561,541. **Cheese, butter, and cream.** A. MATHEWS AND SKAILES, LTD., 9, Denman Street, London Bridge, London, S.E. 1. August 21.

Registration of this trade mark shall give no right to the exclusive use of the word "Farm".

**SUNSWEET.** — B 561,158. **Prunes, apricots, peaches, pears, raisins, apples, and nectarines.** CALIFORNIA PRUNE AND APRICOT GROWERS' ASSOCIATION, 84, West San Antonia Street, San José, California, United States of America. September 11.

SUNSWEET

User claimed from July 8, 1932.

The applicants undertake that this mark, when registered, and the marks Nos. 384,537 (2126), 536,910 (2906), and any other marks associated therewith, shall be assigned or transmitted only as a whole and not separately.